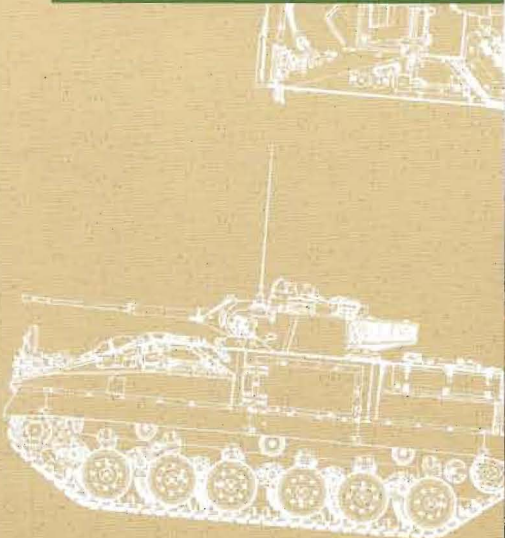
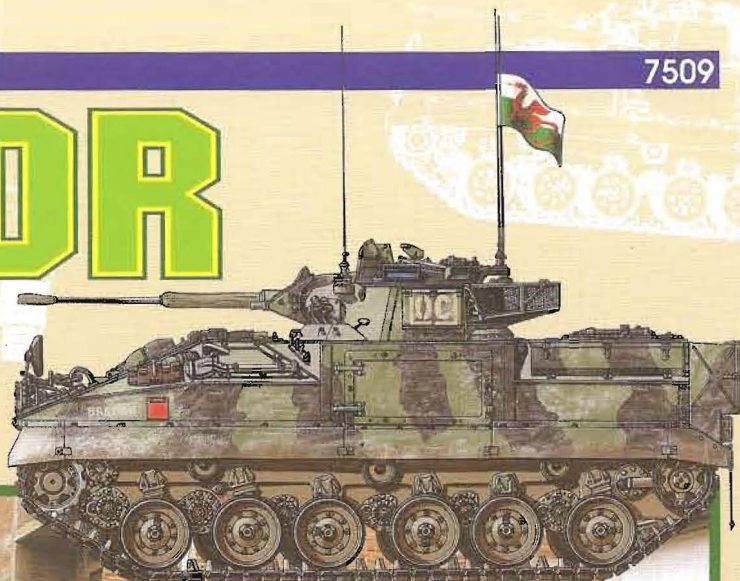


WARRIOR

British Combat Vehicle Tracked

Carl Schulze



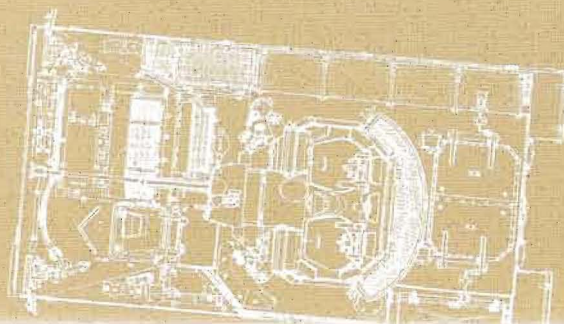
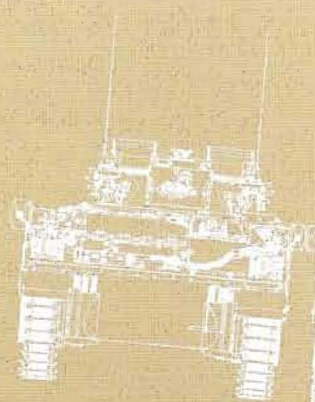
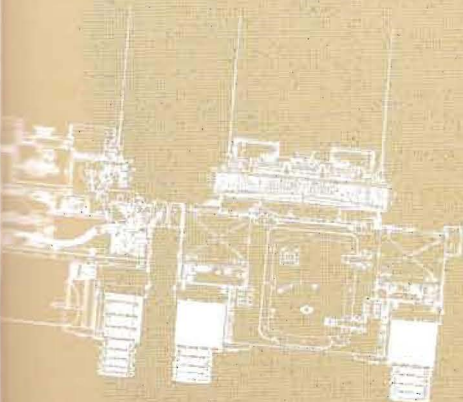
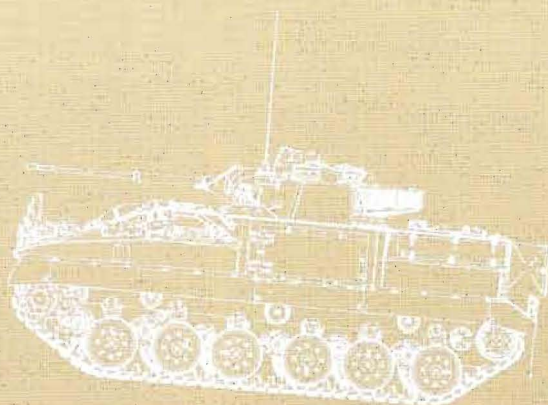
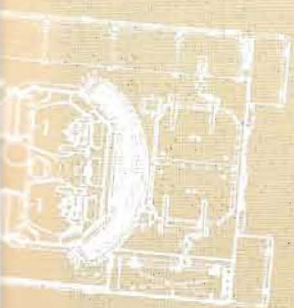
WARRIOR

British Combat Vehicle Tracked

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Abbreviations

ATGW	Anti-Tank Guided Weapon
AOR	Area of Responsibility
AP	Armor Piercing
APDS-T	Armor Piercing Discarding Sabot-Tracer
APES	Azimuth Positioning Elevation System
APC	Armored Personnel Carrier
APSE-T	Armor Piercing Secondary Effect-Tracer
ARV	Armored Recovery Vehicle
BAEE	British Army Equipment Exhibition
BATES	Battlefield Artillery Target Engagement System
BATUS	British Army Training Unit Scuffled
BCV	Battery Command Vehicle
CATC	Combined Arms Training Center
DFWES	Direct Fire Weapons Effect Simulators
FDC	Fire Direction Center
FLOT	Forward Line of Own Troops
FOO	Forward Observation Officer
HEI-T	High Explosive Incendiary-Tracer
HESH	High Explosive Squash Head
HVM	High Velocity Missile
IFV	Infantry Fighting Vehicle
KLA	Kosovo Liberation Army
LAD	Light Aid Detachment
LSW	Light Support Weapon
MAOV	Mechanized Artillery Observation Vehicle
MCV	Mechanized Combat Vehicle
MCRV	Mechanized Combat Repair Vehicle
MNB(C)	Multinational Brigade (Center)
MoD	Ministry of Defense
MRV(R)	Mechanized Recovery Vehicle (Repair)
MSTAR	Manportable Surveillance and Target Acquisition Radar
OSCE	Organization for Security and Co-operation in Europe
OPV	Observation Post Vehicle
OTIS	Observer Thermal Imaging System
RA	Royal Artillery
REME	Royal Electrical and Mechanical Engineers
TA	Territorial Army
TOW	Tube-launched Optically tracked Wire-guided
TP-T	Target Practice-Tracer
VCP	Vehicle Check Point
VIRSS	Visual and Infra-Red Screening Smoke

Acknowledgements

First of all, I would like to thank all the British Army personnel, from Private to General, who supported my work during the last 12 years during which the pictures for this book were taken. I hope all of you will be pleased with this work as there is no other way to thank you for the countless cups of tea handed out to save my spirits, even in the worst conditions, for looking after me in the civil war crisis in Bosnia and Kosovo, for getting my Land Rover on the road again, as well as for providing information and opportunities to take pictures.

Special thanks go to The Cheshire Regiment, The Devonshire and Dorset Regiment, The Royal Regiment of Fusiliers, The Green Howards, The Staffordshire Regiment and 40 Field Regiment Royal Artillery. I feel sorry for the Regiments which have been forced to amalgamate or been disbanded by now, and which allowed me to travel with their Warriors on exercise and operations. Additional thanks go to Major Martin Waters, Bob Skinner, Helga Heine and Mike Middleton. Special Thanks go to Yves Debay, Michael Jerchel, Daniel Nowak, Bob Morrison, Simon Dunstan, Eckhard Uhde, the Director of Public Relations Army (MOD), Plinfo BFG, GKN Defence and Niki Turner from Alvis PLC for the supply of additional pictures.

The author pictured in Bosnia somewhere near Sarajevo in 1998 preparing breakfast at the rear of his army-green Land Rover Defender 110. His vehicle became a common sight for some units during the author's visits to Warrior units that were deployed on exercise or operation from Scotland to Kosovo. (Michael Jerchel)



Introduction, Development and Description of the FV510 Infantry Section Vehicle



A total of 14 Warrior prototypes were built by GKN. One of the four Warrior prototypes deployed during Exercise "Lionheart 1984" was this automotive test vehicle, which was used to test the suspension, breaks and running gear. The vehicle is basically identical to the other prototypes but was not fitted with the two-man Rarden turret. Instead of this, a cabin is mounted that has the same weight that is comprised of electronic gear for collecting data on the vehicle's performance. (Eckhard Uhde)

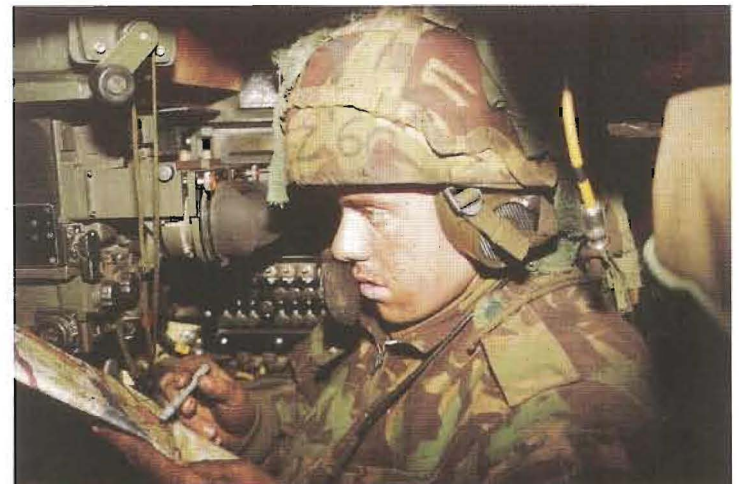


This Warrior FV511 Infantry Command Vehicle was fitted with a Pearson Area Clearance Plough and a Pathfinder marker system. The Area Clearance Plough is a development of the Surface Mine Plough SMP-1. The main difference between the two systems is that the Area Clearance Plough uses a straight 18-segment blade and a heavy chain curtain suspended from two booms. It can clear a 3.8 meter- (12.5 feet-) wide path at a speed of up to 30 km/h (19 mph) though it has an equipment weight of 1.5 tons. (Bob Morrison)

The Warrior's development history dates back to 1967 when an initial proposal for the future armored personnel carrier's requirement for the British Army was made. This was followed by feasibility studies by the MoD between 1968 and 1971, which were later followed by MoD option studies and the initial industrial work called Project Definition 1 from 1972 to 1976. Under Definition 1, which was conducted by the Fighting Vehicle Research and Development Establishment in Chetters, the original concept called for a 30-ton vehicle fitted with Chobham armor, powered by a 750hp diesel engine, with a 30mm Rarden cannon mounted in the turret. An automotive test rig was also to be built. When the program was clearly defined in 1976, following a competition GKN Sankey was selected to be the prime contractor. Between 1977 and 1979 the full project was undertaken. It was at this time that Project Definition 2 was also undertaken as the MCV-80 (Mechanized Combat Vehicle) program. After three test rigs had been built, the MoD selected the MCV-80, which competed



The Warrior family vehicles can be mounted with mine-clearing equipment such as the Pearson Surface Mine Plough SMP-1, which can be seen in this picture. The system physically removes mines from the path of a vehicle using a multi-section, multi-bladed V-shape plough. The system works with 100% efficiency on forest tracks at speeds up to 25 km/h (15.5 mph). With a weight of 1.25 tons the plough has a clearance width of 3.56 meters (11.7 feet) using 18 blades. After modifying the vehicle by welding two wedge blocks to the toe plate, the plough can be fitted within minutes. (Bob Morrison)



The commander of a Warrior FV510 Infantry Section Vehicle is seen at work at his position in the two-man turret designed by Vickers Defence Systems. The soldier belongs to the 1st Bn, The Devonshire and Dorset Regiment. His photograph was taken in November 1992. In front of him are the Pilkington PE Raven sights. The combined day/night sight consists of a x8 magnified day channel, a dual x2 and x6 field view image intensification night channel, and unity power day periscope. The elevation and azimuth are shown inside the weapon system's harmonized sight.

against the M2 Bradley IFV to replace the FV432 APCs in 1980. The test rigs included a suspension test rig, one mobile test rig with a two-man Rarden cannon turret, and one mobile test rig with a 7.62mm machine gun turret. General Staff Requirement 3533 specified the following details regarding the design of the MCV-80: Capacity for 10 men with their combat supplies, tactical mobility to follow the Challenger 1 MBT, protection against small arms fire and artillery shell fragments, and firepower in anti-light armor, general support and air defense roles.

According to Alvis Plc sources, a total of 14 MCV-80 prototypes were built, of which Prototypes 1, 2 and 3 were low-level models that were later destroyed. Prototype 4 was used for anti-mine and blast testing, and its hull still exists. Prototype 5, which is still running, is used by Alvis Plc for evolution trials and demonstrations. Prototype 6 still exists as a running chassis, while Prototype 7, a suspension test rig, was destroyed. Prototype



Warrior FV510 Infantry Section Vehicle of the 1st Bn, Grenadier Guards is seen during Exercise "Key Flight 1989" in Germany. Note the climbing step on the vehicle's left front, the flap over the external operating handle for the fire extinguisher system, and the large NBC access door on the vehicle's left side. Also visible are the bank of four smoke dischargers, the driver's hatch in the access position, and the sockets for the camouflage net frame. Note also the vehicle's running gear, which consists of six rubber-tired road wheels, the front drive sprocket, the rear idler, and three track-return rollers on each side.

8 became part of the REME school and is used for easy maintenance assessment. The fate of Prototypes 9 and 10 is unclear. Of Prototypes 11 and 12, one was fitted for trials with a HOT Euromissile turret while the other was used in the Vehicle Electronics Research Defence Initiative (VERDI). During the development program, these twelve Prototypes archived approximately 200,000 km due to the British Army's requirement



This Warrior FV510 Infantry Section Vehicle belongs to the 1st Bn Grenadier Guards, the first armored infantry unit in the British Army to be equipped with operational Warriors. The turret detail shows to advantage the armored shutters over the Raven sights. Painted on the right shutter is the vehicle's name, Marie Antoinette. Other section vehicles of the 1st Bn Grenadier Guards were spotted bearing the names Boudicea and Renown. In addition, the photo illustrates well how the 30mm L21 Rarden gun is placed in the front center of the turret and the mounting of the smoke dischargers in banks of four. Note the wind deflector over the radiator's louver hatches, which allows for better circulation of cooling air.

for reliability. Prototype 13 and Prototype 14 were that of the MCRV and the MRV(R). An additional Prototype was built as a demonstrator for the Warrior Utility Vehicle. In November 1984, following Exercise "Lionheart 1984" in Germany where the MCV-80 proved its ability to operate with the Challenger 1 MBT, the vehicle was accepted for service in the British Army. The vehicle received the name "Warrior" in 1985.



Belonging to A Company of the 1st Bn, The Devonshire and Dorset Regiment, this Warrior FV510 Infantry Section Vehicle was photographed while taking part in an exercise in November 1992 at the Soltau Lüneburg Training Area in Germany. It is interesting to note that all the vehicles like this that belonged to that unit that were seen at the exercise had their storage baskets on the hull removed. Painted in yellow in front of the call sign on the hull is the fuel filling cover that is linked via the fuel filler pipe to the tank placed on the vehicle's floor beneath the turret.



A complete Warrior crew of the 2nd Bn, The Royal Regiment of Fusiliers, consisting of commander, driver, gunner and seven infantrymen, poses in front of their Warrior FV510 Infantry Section Vehicle. Laid out in front of them is most of the onboard equipment. This includes the camouflage kit, maintenance equipment, entrenching and recovery equipment, BV, water and oil canisters, LAW anti-tank weapons, and the soldiers' personal kit. The soldiers are armed with their personal weapons, which in addition to the 5.56mm SA 80s include two 5.56mm LSWs and a 7.62mm GPMG machine gun. Missing in this picture is the load of ammunition carried in the vehicle for the various weapons.

The production of the Warrior began in January 1986 at the newly built factory complex in Telford, Shropshire. The first production batch consisted of 290 vehicles, including 170 FV510 Infantry Section Vehicles, the first of which was formally handed over to the British Army in May 1987. In mid-1988, the 1st Bn, Grenadier Guards, then belonging to the British Army of the Rhine, was the first unit to become operational with the Warrior. While the complete hull is built by GKN (which became part of Alvis Plc in 1998), the two-man turret that houses the Royal Ordnance 30mm L21A1 Rarden gun is supplied by Vickers Defence Systems. The complete ready-for-installation power pack is supplied by Perkins Engines. All of the components are assembled at Telford. The last Warrior for the British Army left Telford in 1995. In addition to the Warriors built in Telford for the British Army, 254 Desert Warriors for Kuwait were also produced between 1994 and 1997.

Versions in Service with the British Army

The original British Army requirement was for 1053 Warriors to replace the FV432 series vehicles in all 13 mechanized infantry battalions. This number also included war reserve vehicles, vehicles for BATUS in Canada, maintenance float, and vehicles for trial work. In the 1993 "Options of Change", the number of armored infantry units was reduced to eight, which led to a reduction in the number of required Warriors to 788 vehicles of different variants. As a result of the 1998 "Strategic Defence Review", the number of armored infantry battalions was raised to nine, but this did not affect the number of delivered Warrior vehicles since the final deliveries were made in 1995. The total number of 788 in-service vehicles breaks down into the following variants:

- 489 Warrior FV510 Infantry Section Vehicles, including three replacement vehicles for Warriors lost during the Gulf War. This brings the number to 492 produced vehicles. Among the 489 vehicles, 105 were to be fitted with TRIGAT MR. In the meantime they are used as Milan platoon vehicles as it is now unlikely that TRIGAT MR

will enter into service with the British Army. These vehicles are currently fitted with storage racks for the Milan ATGW System.

- 84 Warrior FV511 Infantry Command Vehicles
- 105 Warrior FV512 Mechanized Combat Repair Vehicles
- 39 Warrior FV513 Mechanized Recovery Vehicles (Repair)
- 52 Warrior FV514 Mechanized Artillery Observation Vehicles
- 19 Warrior FV515 Battery Command Vehicles



A Warrior FV510 Infantry Section Vehicle speeds up during "Ulan Eagle 1996" at Drawsko Pomorski Training Area. The Perkins V 8 17.4-liter turbo-charged, air-cooled diesel engine provides the Warrior with a top speed of 75 km/h (47 mph). The vehicle's Perkins X-400-4B fully automatic transmission, with 4 forward and 2 reverse gears, operates forward driving using gear groups 1-4, 1-3, 1-2, and emergency 1. The driver can select all of these manually. The engine provides 550 hp at 2300 rpm and allows the 25.4-ton vehicle to accelerate from 0 to 48 km/h (0 to 30 mph) in 13.5 seconds.



This rear view of a Warrior FV510 Infantry Section Vehicle shows the large power-operated rear door with its single bulletproof vision block. Note the two storage boxes for additional equipment to the left and right of the door. Visible above the number plate is the operating panel for the door. The door can also be operated from inside the troop compartment and from inside the turret. One of a number of portable fire extinguishers can be seen in the center of the door.

Description of the FV510 Infantry Section Vehicle

The Warrior FV510 Infantry Section Vehicle, the basic vehicle of the Warrior family, is built around a basic hull. It can be adapted to suit a variety of roles in an infantry battle group. The hull is built around an

armor-plate floor and vertical partition plates separate the driver's compartment, power pack compartment and rear compartment. The compartments are enclosed by welded aluminium armor plates and overhead openings, with armored covers providing access to the power pack and driver's compartment. Louvers in the power pack access door allow cooling air to be drawn in by the power pack, while a separate louver in the compartment's right side plate enables engine exhaust fumes and air used for cooling to be vented outside the vehicle. Vertical side plates welded to either side of the floor plate provide mounting fixtures for assemblies of the drive suspension and track system. Detachable plates provided in the floor can be removed from beneath the vehicle when access is required for maintenance purposes. While the protection level of the all-welded aluminium armor is kept secret, it is most likely that it protects the crew against small arms fire up to 14.5mm AP rounds, 155mm air burst artillery shell fragments and 9kg anti-tank mines.

Mounted to the vehicle's front right is the Perkins V 8 four-stroke direct-injection compression ignition engine, an integral part of the vehicle's power pack that also incorporates the transmission unit with the fully automatic gear box, brakes, hydrostatic steering unit, and the cooling system components. This arrangement enables quick removal of the entire power pack for replacement or repair. The gearbox provides four forward and two reverse speeds in ranges that the driver can manually select. The power pack electronics consist of dual starter motors, a generator, gear selection solenoids, and a number of sensors that are associated with status lamps on the driver's instrument panel.

The driver's compartment contains an adjustable (height, backward, forward and neck-, shoulder- and backrest) seat with safety harness and all



Here a nearly complete Warrior FV510 Infantry Section Vehicle crew of the 2nd Bn, The Royal Regiment of Fusiliers poses for a photograph atop their vehicle during Exercise "Ulan Eagle 1999". The commander and the gunner are wearing their radio headsets, while the driver can be identified by his wind-, sun- and dust-protection goggles. The infantrymen are armed with the usual mix of SA 80 and LSW 5.56mm-caliber weapons. Two are armed with the LSW, while the rest carry the assault rifle. DFWES equipment is fitted to all the weapons and is worn by the soldiers.



This picture of a dismount troop belonging to 2nd Bn, The Royal Regiment of Fusiliers in the rear compartment of a Warrior was taken during Exercise "Ulan Eagle 1999" in Poland. Note the cramped conditions the armored infantrymen must endure in the back of the vehicle. In this case, the soldiers are lucky since their troop only consists of five men rather than the maximum of seven. The large two-piece roof hatch can be seen in the roof. It opens outward to the left and right and can be fastened in the open position.

controls to start, drive and stop the vehicle. Most of the electrical controls are contained on the driver's instrument panel to his front left, which also contains status lamps. Gears are selected by electrical control signals applied to the power pack from the gear range selector fitted adjacent to the left of the driver's instrument panel. The selector has seven positions: reverse one, reverse two, neutral, first to fourth gear, first to third gear, first to second gear, and emergency. As the driver selects one of the positions, the transmission automatically changes between the selected gears. The driver's steering control is hinged downward from a stowed position and secured in an operational position. Switches on the steering control enable the driver to wash and wipe the vision device, indicate the turning directions of the vehicle, operate the horn, and transmit messages on the vehicle's communication system. The vehicle is easily steered by turning the device left and right to the required directions. The driver also has a foot brake, accelerator and parking brake. An ANV No.44 Mk3 day periscope, an AV Image Intensified L16A1 night vision periscope and a detachable windscreen are provided and can be fitted by the driver if required.

Fuel tanks are strapped to the floor of the rear compartment, with pipes and hoses delivering fuel to quick-release connectors mounted on a disconnect plate on the engine. From these connectors fuel is delivered to the power pack, as well as to the heater pack of the environmental control system. The environmental control system draws air into the vehicle through an armored air inlet on the hull roof. The system is placed in a sealed compartment on the left hull side, which is accessible from the



Here in the driver's access hatch is mounted the No.44 Mk3 Periscope AV. This can be exchanged with an L16A1 passive night-vision image-intensified Periscope AV for driving at night. The hatch is shown here in the fully raised position, but it can also be raised and secured to a half-raised position for "head out" driving. Note the electrical connection, which is needed for the power supply of the night-vision periscope.

outside through a hinged armored door. An air filtration pack mounted behind this door on the left-hand sponson supplies the crew with filtered air during NBC and non-NBC conditions. The air can be heated by heat extracted from the engine coolant when the engine is running or by heat generated by a crew/engine heater when the engine is shut off.

The vehicle is supported on twenty-four rubber-tire road wheels, fitted in pairs of twelve suspension units. Six units are fitted to each side plate of the hull structure, with the rear unit and front two units of each side incorporating rotary dampers. Each of the twelve units is fitted with a traverse torsion bar to provide suspension. The positions of the wheel pairs, designated as stations one to six on each side, are referenced from the vehicle front. Independent torsion bar suspension is provided for each wheel pair, with hydraulic damping at stations one, two and six. Stations three, four and five are undamped. Drive from the power pack transmission is transferred through coupling shafts to left and right final drive units. Steering, gear-range and breaking controls applied to the transmission from the driver's compartment modify power available at each final drive. The final drive units function as reduction gearboxes, and a front mounted drive sprocket draws a continuous, rubber padded track around the roadwheels, three pairs of guide-rollers and a track idler wheel. The idler wheels can be adjusted to maintain correct track tension.

Six 12V UK 6 TN, No.4, Mk 3 batteries located in the hull provide the electrical power for the vehicle. Four of these connected in a parallel series provide 24V (200 Ah) for the main electric services, and two

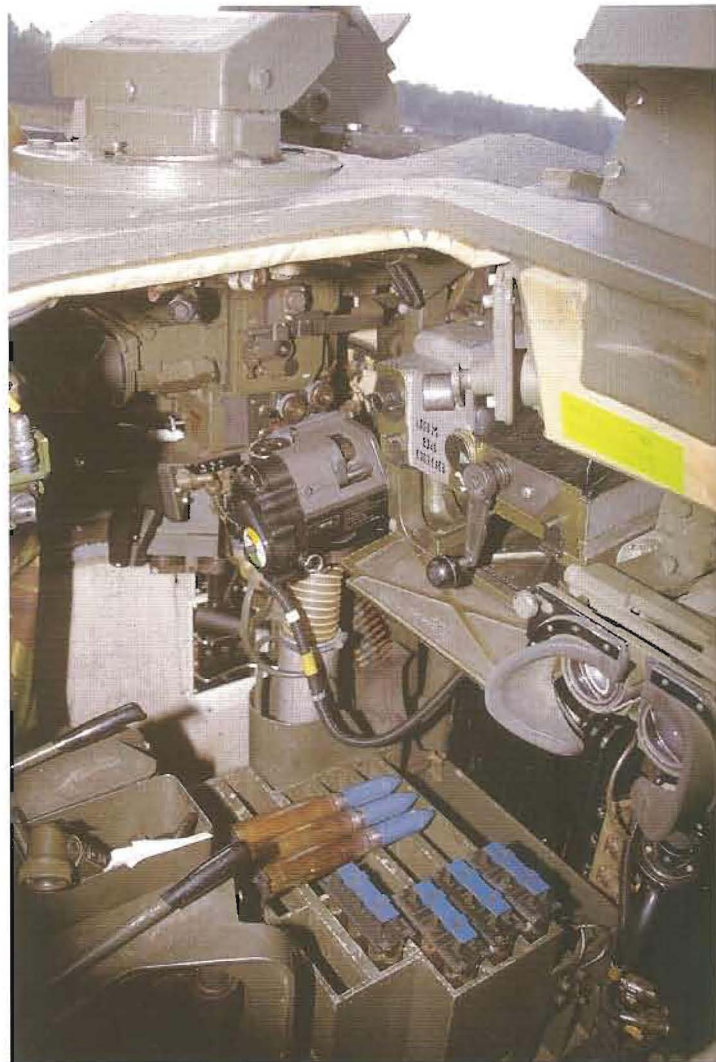


Shown here is the gunner's position in the turret. His Pilkington PE Raven sight can be seen in the center mounted to the roof of the turret. To its left is the open chamber where the 30mm L21A1 Rarden gun is loaded with the three-round clips. Visible under this are the controls of the 7.62mm L94A1 Chain Gun. Also visible is the weapon elevation hand wheel of the Rarden gun and coaxial chain gun. Note the clip of three blue-tipped rounds displayed in the turret's ready ammunition storage area. Although empty cartridges are ejected to the outside of the vehicle during live firing, the ammunition belt links from the chain gun are guided to a collecting box via a tube.

connected in series supply 24V (100 Ah) for radio services and emergency power for engine start-up. The turret of the Warrior FV510 infantry section vehicle is situated slightly to the left in the center of the vehicle's roof. The turret, which is designed and manufactured by Vickers Defence Systems, is of an all-welded-steel construction. Inside the two-man turret the commander is seated to the right and the Rarden gunner to the left. Between them to the front is mounted the 30mm L21A1 Rarden cannon. The 360° power-traversed non-stabilized turret is mounted on a low-friction roller race, and power and communications are linked from the hull to the turret via a slip ring designed rotary base junction. In an emergency the turret can be traversed manually, while weapon elevation is conducted manually all the time. In front of the commander and the gunner are mounted two Pilkington PE Raven sights. The combined day/night sight consists of a x8 magnified day channel, a dual x2 and x6 field view image intensification night channel and unity power day periscope. Inside the weapon system's harmonized sight, the elevation and azimuth are shown. In addition to the Raven sights, eight roof-mounted periscopes are arranged in a circle on the turret. They allow the crew to observe the landscape surrounding the vehicle when operating with closed hatches. Both the commander and gunner have a single-piece hatch that opens to the rear. Between the gunner and commander there is also mounted a 360° traversable periscope that can be folded up to the roof like the periscopes in the rear compartment.

The armament of the Warrior consists of the Royal Ordnance 30mm L21A1 Rarden cannon, which has a fully enclosed system and only reaches 43mm (17 inches) into the turret, and a coaxial-mounted 7.62mm L94A1 Chain Gun. The recoil operated self-loading Rarden gun has a cyclic rate of fire of 80 rounds a minute and is fed with three-round clips. During firing, the empty cases are ejected forward. The weapon has a maximum range of 4000 meters (4372 yards), but engagement usually takes place between 400 and 1500 meters (437 and 1640 yards), which is the weapon's effective range. Ammunition for the weapon includes training ammunition like APDS-T, APSE-T and HEI-T rounds. When the L14A2 APDS-T rounds are fired, the 30mm Rarden can penetrate up to 40mm (1.6 inches) of steel armor at an incidence of 45°. The electrically fired 7.62mm L94A1 Chain Gun has a cyclic rate of 570 rounds a minute and a effective range of up to 1000 meters (1094 yards).

The infantry leaves the troop compartment in the rear of the vehicle through a large power-operated door that opens to the right of the vehicle.



This view of the interior of the turret on the commander's side offers us a closer look at the loader for the 30mm L21A1 Rarden gun and the 7.62mm L94A1 Chain Gun. Also visible is the 360° traversable periscope mounted on the turret roof between the gunner and the commander. The commander's Pilkington PE Raven sight may be seen on the right side of the picture. Note the three-round ammunition clips filled with TP-T L12A1 rounds. Other rounds available for the Rarden gun are L5A2 APSE-T, L13A1 HEI-T and L14A2 APDS-T. Forty-five rounds can be stored in the ready position under the gun, while another 205 rounds are stored inside the vehicle.

It is also possible for the infantrymen to fight from atop the vehicle by opening the large double roof hatches. Also mounted in the roof are two periscopes, one on either side to provide the crew with a backward vision before leaving the vehicle. The vision block mounted on the rear door serves the same purpose. Inside the vehicle a spall liner is fitted to the side walls, roof and rear door. In the rear compartment, the infantry sits on padded two-man benches, of which two are placed on the right side of the vehicle. A third is placed along with a single seat (under which the NBC-chemical toilet is situated) to the left. A total of seven infantrymen can be carried in the rear. Though there is a set of seat belts for each man, these are usually not used by the crews since they cannot be worn when the troops are in fighting order, e.g., wearing webbing. The crew's kit and all supplies for up to 48 hours can be stored under the seats and in the area in the sponsons. Mounted near the turret on the floor is the BV (boiling vessel) that the vehicle's crew constantly uses to create hot drinks and to heat their rations.

The last thing to be mentioned is the fire protection system, which uses Halogen gas as an extinguishing agent. Situated in the front of the vehicle behind the engine compartment, it can be operated either by two external handles placed on the left and right sides of the vehicle or by an internal operating handle placed in the driver's compartment.



A Warrior FV510 Infantry Section Vehicle belonging to the Milan platoon of an unknown armored infantry regiment drives to a water pond at the Drawsko Pomorski Training Area during "Ulan Eagle 1998". The vehicle is able to ford to a depth of 1.3 meters (4.3 feet). The rectangle and the "32E" call sign clearly identify the vehicle as part of a Milan platoon.



The interior view of a Warrior FV510 Infantry Section Vehicle being used as a Milan platoon vehicle allows us to recognize a lot of details. The vehicle's fuel tank, which is made out of transparent plastic, can be seen under the turret basket. The mesh screen of the basket slides to the left, as shown in the picture, allowing the crew to enter the turret through the rear compartment. In front of the fuel tank to the left can be seen the boiling vessels that are used by the crew to heat food and provide hot drinks. The two foldaway periscopes can be seen in the roof to the left and right of the turret. Also visible are the crew benches, seat belts, air diffuser of the environmental system, and the spall lining. Since it is unlikely that the TRIGAT MR will be replacing the Milan, the Warriors of the Milan platoons are currently fitted with storage racks on the left side of the interior to hold 12 missiles. Up to now, without the racks, during operations the crew crammed up to 20 missiles into the rear of the vehicle. Note the way the crew has made themselves a home in the vehicle.



Warrior FV510 Infantry Section Vehicles spread out prior to an attack during exercise "Ulan Eagle 1999". The drivers' hatches of the first two vehicles can be seen looked in the "head out" driving position. This practice is deadly in battle and only used during attack exercises for safety reasons. The Periscope AV No.44 Mk3 can be seen in the hatch. While the gunner's Raven sight is open, that of the commander is hidden under the armored protective cover. A blank attachment, which can be identified by its yellow color, is mounted to the vehicle's chain gun.



The brigade commander of 7 Armoured Brigade, "The Desert Rats" used this Warrior FV511 Infantry Command Vehicle (call sign "14D") during exercise "Ulan Eagle 1999". It is easily distinguished by its four radio antennae. Painted on the side of the vehicle is the Brigade's famous red jerboa badge. Clearly visible are the vehicle's side skirts, which were fitted to some of the prototypes and to all of the production Warriors.

Technical Data Warrior Section Vehicle FV510

Crew:	3 (Driver, commander, gunner) and 7 infantrymen in the rear
Height:	2.74 meters
Width:	3.10 meters
Length:	6.58 meters
Weight (fully laden for combat):	25.4 tons
Engine type:	RR (Perkins) V 8 17.4 Liter (TCA) turbo-charged and air-cooled
Transmission:	Perkins X-400-4B fully automatic transmission with 4 forward and 2 reverse gears
Steering:	Variable hydrostatic-drive differential steering system
Maximum road speed:	75 km/h
Fuel capacity:	741 liters
Ground Clearance:	0.48 meters
Endurance:	600 km
Ground Clearance:	0.48 meters

Fording:	1.3 meters
Maximum trench crossing:	2.5 meters
Vertical obstacle:	0.75 meters
Maximum Gradient:	60%
Side slope:	40%
Track width:	460 mm
Width between tracks:	2080 mm
Length of track in contact with the ground:	3816 mm
Number of links per track:	82 links
Main armament:	1x 30mm L21 Rarden cannon, non-stabilized, with 250 rounds of ammunition stored on board
Coaxial armament:	1x 7.62mm L94A1 Chain Gun, non-stabilized, with 2000 rounds of ammunition stored on board
Smoke laying equipment:	2x4 smoke grenade dischargers
Gun elevation and depression:	+45° to -10°
Turret traverse:	360° electrical or manual
Weapon sight:	2x combined Pilkington PE Raven day/night sights

Warrior Battalions — Britain's Armored Infantry Units



Here a well-camouflaged Warrior FV510 Infantry Section Vehicle can be seen crossing an AVLB bridge in the build-up phase of a battle group attack, when the all arms battle group is moving from its harbor area to its line of departure. The Warrior, which belongs to the 1st Bn, The Green Howards (which in turn belonged to 4 Armoured Brigade), was seen during Exercise "Ulan Eagle 1998". The RR (Perkins) V 8 17.4-liter (TCA) turbo-charged, air-cooled diesel engine allows a maximum road speed of 75 km/h (47 mph), and the off-road speed is nearly as high. With a ground clearance of 0.48 meters (1.6 feet), a maximum trench crossing width of 2.5 meters (8.3 feet) and vertical obstacle crossing capacity of 0.75 meters (2.5 feet), the vehicle is well designed to fit the needs of the armored infantry.

Currently the British Army can field 55 infantry battalions, 40 of which are regular units, while the remaining 15 belong to the Territorial Army. These battalions are equipped for specific tasks as armored, mechanized, light role and airborne infantry battalions. Only the armored units are equipped with Warrior Infantry Fighting Vehicles, while mechanized units are equipped with the Saxon wheeled APC. Except for the airborne infantry role, which is exclusively filled by the battalions of the Parachute Regiment, and the Gurkhas, who are only tasked with the light role, all regular battalions rotate through the different roles. For example, they are in the armored infantry role for four to six years every couple of years. By the end of 2000, the British Army fielded a total number of nine Armored Infantry Battalions equipped with Warrior Infantry Fighting Vehicles. Of these, six belonging to the 1st (UK) Armoured Division were based in Germany, while the remaining were based in Great Britain as part of 3rd (UK) Armoured Division.

List of Warrior Battalions and bases as of October 2000:

- 1st Bn, Irish Guards Münster, Germany 4 Armoured Brigade
- 1st Bn, The Duke of Wellington's Regiment Osnabrück, Germany 4 Armoured Brigade
- 1st Bn, The Black Watch Fallingbommel, Germany 7 Armoured Brigade
- 2nd Bn, The Royal Regiment of Fusiliers Celle, Germany 7 Armoured Brigade
- 1st Bn, The Royal Regiment of Wales Paderborn, Germany 20 Armoured Brigade
- 2nd Bn, The Royal Green Jackets Paderborn, Germany 20 Armoured Brigade
- 1st Bn, The King's Own Royal Border Regiment Catterick,



With their Warrior FV510 Infantry Section Vehicles halted in front of enemy trenches, the dismounted sections leave the Warriors through the single-piece rear door of the vehicle. Soldiers and vehicles are equipped with DFWES in order to add realism to the exercise. Both Warriors belong to A Company, 2nd Bn, The Royal Regiment of Fusiliers, which formed part of 7 Armoured Brigade at the time of this writing. The picture was taken during Exercise "Ulan Eagle 1999" in Poland.

Great Britain 19 Mechanized Brigade

- 1st Bn, The Staffordshire Regiment Tidworth, Great Britain 12 Mechanized Brigade
- 1st Bn, The Princess of Wales's Royal Regiment Tidworth, Great Britain 1 Mechanized Brigade

In past years the following units have been in the armored infantry role, equipped with the Warrior IFV: 1st Bn, Grenadier Guards; 1st Bn, The Royal Scots; 3rd Bn, The Royal Regiment of Fusiliers; 2nd Bn, The Royal Anglian Regiment; 1st Bn, The Staffordshire Regiment; 1st Bn, The Cheshire Regiment; 1st Bn, Coldstream Guards; 1st Bn, The Royal Highland Fusiliers; 1st Bn, The Green Howards; 1st Bn, The Devonshire and Dorset Regiment; 1st Bn, The Royal Welsh Fusiliers; 1st Bn, Scots Guards; 3rd Bn, The Light Infantry; 1st Bn, Prince of Wales Own Regiment of Yorkshire; 1st Bn, The Worcestershire and Sherwood Foresters Regiment; and 2nd Bn, The Light Infantry.

All armored infantry battalions of the British Army are equally structured. They consist of the HQ company, three armored infantry companies and a fire support company. The inventory of the armored infantry battalions totals 63 Warriors in the following variants: 36x Warrior FV510 Infantry Section Vehicles, 11x Warrior FV510 Infantry Section Vehicles for Milan, 9x Warrior FV511 Infantry Command Vehicles, 4x Warrior FV513 Mechanized Recovery Vehicles (Repair), and 3x Warrior FV512 Mechanized Combat Repair Vehicles. Vehicles other than the Warrior inside the armored infantry battalion are eight Scimitar CVR(T) reconnaissance vehicles, seven Spartan CVR(T)s, two Sultan CVR(T)s, one Samson CVR(T), twenty FV432s used as command post vehicles, an armored ambulance and mortar carrier, twenty-three 8-ton trucks, as well as nineteen so-called B-vehicles, including various Land Rover 90 and 110 variants.



"RAGLAN", a Warrior FV510 Infantry Section Vehicle from the 1st Bn, The Royal Regiment of Wales, passes the camera at high speed during an attack. In 2000, the 1st Bn, The Royal Regiment of Wales, together with the 2nd Bn, The Royal Green Jackets, formed part of 20 Armoured Brigade. It was in this capacity that they deployed during Exercise "Ulan Eagle 2000". Note the Welsh flag flying from one of the radio antennas, illustrating the origins of the regiment. All Warriors of the 1st Bn, The Royal Regiment of Wales are named after towns in Wales. The following names are just some examples: CWRT-Y-GOLLEN, TREDEGAR, PEN-Y-FEN, ABERSYCHAN, BRECON, NEWBRIDGE, NEWPORT, ABERTILLERY, RHYMNEY, PONTYPOOL, ABERGAVANY, PEMBROKE, DEVILSBRIDGE and ABEDARE.



The fire support company in each armored infantry battalion contains a mortar platoon with nine 81mm mortars on FV432 series Warriors, an anti-tank platoon with 11 Warriors and 20 Milan ATGW systems, and a reconnaissance platoon with eight Scimitar CVR(T)s. Here a Scimitar CVR(T) of the fire support company of the 2nd Bn, The Royal Regiment of Fusiliers operates along with a Warrior Infantry Section Vehicle of the same unit, when the Fusiliers provided the OPFOR for Exercise "Ulan Eagle 1998".

On the battlefield, the armored infantry battalion usually reforms into an all arms battle group, which means that the unit attaches one of its armored infantry companies to an armored regiment. In exchange, it receives a squadron of Challenger 1 or 2 main battle tanks. Other elements attached to the armored infantry battalion are an engineer squadron, a battery of AS 90s from the Royal Artillery, as well as air defense assets. There is no fixed design for a battle group, and the strength of the components can vary according to the battle group's task. The all arms battle group is able to fight in all types of operations – defensive, offensive or delaying battles – and also conduct operations during the transitional phases of operations, e.g., advance to contact or meeting engagements. In an engagement, the Warrior Infantry Fighting Vehicle is basically the transport in which the infantry moves into battle. It also provides significant fire support once the infantry section has dismounted.

What follows is an example of what a battle group attack might look like. As the artillery of the battle group, led by an FOO from his Warrior FV514 MAOV, accompanied by the mortar section, shells the objective

(which for a battalion size battle group may be a dug-in company position of the enemy), the attack begins. It is spearheaded by the engineers, who breach enemy obstacles like minefields or anti-tank ditches. The Challengers and Warriors will then move through these breaches at high speed. After they have passed the obstacles, they spread out and attack. This is the moment when the artillery barrage stops and the tanks destroy enemy armor in the objective. They then will advance further behind the objective in order to form a screen to stop the enemy from sending in reinforcements. Meanwhile, the Warrior FV510 Infantry Section Vehicle of the infantry move at high speed as close as possible to the enemy positions, suppressing the enemy with fire from their 30mm Rarden guns and 7.62mm chain guns. The Warriors will stop in front of the enemy trenches, and the sections will dismount, leaving the vehicles through the rear door and spreading out to both sides of the vehicle. While the



After having dismounted from their Warrior FV510 Infantry Section Vehicle (visible in the background), soldiers of the 2nd Bn, The Royal Regiment of Fusiliers engage the enemy with their 5.56mm SA 80 assault rifles and LSW. In the rear of each Warrior there is usually a dismounting element that is seven soldiers strong, but due to the recruiting problems of the British Army in the '90s, this is often only four or five men strong. This makes life a little more comfortable for the troops in the back of their Warriors.



A Warrior FV510 Infantry Section Vehicle of the 1st Bn, The Royal Highland Fusiliers is shown during Exercise "Ulan Eagle 1996", the first of a series of exercises conducted by the three brigades of 1st (UK) Armoured Division at the Drawsko Pomorski Training Area in Poland. The training year for a brigade starts in January on the battalion and regiment level, which is followed by battle group training involving all arms. This includes various live firing of all kinds and is highlighted by Exercise "Prairie Eagle", which is conducted in spring in Poland. Here units prepare themselves before they take part in the "Medicine Man" exercise at BATUS in Canada. After this, the level changes from battle group to brigade level up to the grand finale in Exercise "Ulan Eagle" in Poland.



The Drawsko Pomorski training area provides great environmental variety for the British armed forces, containing as it does great open plains like BATUS in Canada, as well as large areas of woods of different thickness. Thus, during an exercise, commanders on all levels and their troops are often confronted with changing terrain. This feature, as well as the cost effectiveness of the Polish training area, makes it ideal to be adopted for the random training system inside 1st (UK) Div. Here Warriors of the 2nd Bn, The Royal Regiment of Fusiliers cross a water obstacle on M-3 rigs of 28 Amphibious Engineer Regiment during Exercise "Ulan Eagle 1999".



During operations and exercises, the rear of the Warrior becomes home for the soldiers of the armored infantry battalions. Since the modern battlefield shifts quickly, they spend most of the day bumping around in the so-called troop compartment, getting motion sick while their unit moves to engage the enemy. Often, after long hours of travel, the troops disembark to find themselves in the middle of a noisy battlefield with the order to clear enemy positions. The picture shows a more relaxed moment, when soldiers of the 2nd Bn, The Royal Regiment of Fusiliers enjoy "Schoff", which consists of curried lamb from their Compo Rations heated in the BV, a boiling vessel mounted in all British Army fighting vehicles.

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This Warrior FV510 Infantry Section Vehicle of A Company, 2nd Bn, The Royal Green Jackets was seen during an exercise in May 1997 in Sennelager. Note the plastic pipe fascine hanging on the right side of the vehicle. The crew drops these pipes in gaps in the road such as ditches to minimize the bank gradient of the ditch and allow the Warrior to cross without getting stuck. The "20" painted on the turret indicates the vehicle belongs to the commander of the second platoon. (Daniel Nowak)

dismounted troops storm the enemy trenches and clear them out, the Warriors will either reverse or advance to previously selected positions from which they can provide cover fire for the dismounted battle. Once the objective is cleared, the Warriors will again move, this time to gather their infantry sections before they join the rest of the battle group. During what is known as the reform process, a screen is formed to stop an enemy counterattack and the battle group prepares to defend the captured objective against any such counterattack.

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Following a successful attack conducted in the early mist, soldiers of the 2nd Bn, The Royal Regiment of Fusiliers cram themselves back into their Warrior FV510 Infantry Section Vehicle during Exercise "Ulan Eagle 1999". In the rear of the vehicle there is space for seven fully equipped infantrymen, four of which are seated on the right hand side while the remaining three are seated on the opposite side of the vehicle.

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Each of the three armored infantry companies in a battalion is equipped with sixteen Warriors. The company consists of two Warrior FV511 Infantry Command Vehicles for the Company commander and his 2IC, one Warrior FV512 MCRV, one Warrior FV513 MRV(R), and twelve Warrior FV510 Infantry Section Vehicles divided among the three platoons of the company. In the platoon, one vehicle fitted with an additional radio belongs to the platoon commander, while the others each belong to one section. This Warrior FV510 Infantry Section Vehicle of the 2nd Bn, The Royal Regiment of Fusiliers was photographed in Poland during Exercise "Ulan Eagle 1999".



Belonging to 2nd Bn, The Royal Regiment of Fusiliers, this Warrior FV510 Infantry Section Vehicle is taking part in Exercise "Ulan Eagle 1998" at which time the battalion provided OPFOR. This is indicated by the red cross on the side of the turret. Strapped to the front of the vehicle is a makeshift toilet made by the crew in order to enhance living conditions in the field. A chemical toilet is mounted under a padded troop seat on the left side of the rear troop compartment of the Warrior FV510 Infantry Section Vehicle, which is designed for times of fighting under NBC conditions when the troops cannot leave the vehicle without being contaminated.



This Warrior can be identified as a vehicle of Milan platoon of a fire support company of an armored infantry battalion by the Milan ATGW system visible at the vehicle's rear. The Milan platoon is equipped with eleven Warrior FV510 Infantry Section Vehicles. The vehicles of the platoon commander and the 2IC have one firing post on board, whereas each of the three Warriors of each of the three platoons carry two firing posts. This brings the total number of Milan firing posts in the platoon to twenty. (PINF BFG)



Here a column of Warriors of the 1st Bn, The Royal Regiment of Wales moves into their staging area after they were unloaded at the railway head of the Drawsko Pomorski training area in Poland during Exercise "Ulan Eagle 2000". The first two vehicles are FV510 Infantry Section Vehicles, followed by two FV511 Infantry Command Vehicles. The inventory of the armored infantry battalions numbers 36 Warrior FV510 Infantry Section Vehicles, 11 Warrior FV511 Infantry Section Vehicles for Milan, 9 Warrior FV511 Infantry Command Vehicles, 4 Warrior FV513 Mechanized Recovery Vehicles (Repair), and 3 Warrior FV512 Mechanized Combat Repair Vehicles.

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A British Army Warrior FV510 Infantry Section Vehicle speeds up during a "Medicine Man" exercise at BATUS in Canada. During each of the "Medicine Man" exercises, six of which are conducted each year, an all arms battle group is trained under the most realistic conditions using live ammunition. Note the red and white markers on the turret, which identify the state of the weapons on the vehicle. A raised white sign means that all weapons are clear of ammunition, while the red marker, which can be seen here, indicates that the weapons of the vehicle are loaded, but a safety catch is engaged. The red indicator is raised automatically when the gunner's Raven sight cover is opened. This means the vehicle is about to fire either its 30mm main armament or the coaxial 7.62mm chain gun. All vehicles used in BATUS are painted green and sand rather than black and green like they are in Europe. (MOD via Simon Dunstan)

This Warrior FV510 Infantry Section Vehicle belongs to the 2nd Bn. The Royal Anglian Regiment. When this picture was taken in 1997, this unit was the CATC armored infantry battalion for exercises at Salisbury Plain. To make it easier to identify the OPFOR vehicles, they were painted in sand and green rather than the usual black and green used by all other British forces in central Europe. Note the red flag on the right side of the vehicle under which one of the two outside operating handles for the fixed fire extinguishers is raised. The second handle is placed on the left side of the vehicle on the right of the driver's hatch. (Simon Dunstan)



FV511 Infantry Command Vehicle

The Warrior FV511 Infantry Command Vehicle, which is the second version of the Warrior in use with the armored infantry battalions, exists in two different versions: company and battalion command vehicle. Though both versions are basically the same as the section vehicle, they have additional communication equipment mounted to meet required tasks. Authors of some publications speak about a platoon command version, but this vehicle is not a FV511, but simply a normal FV510 section vehicle fitted with additional radio equipment. Several main exterior features help to identify the FV511 Infantry Command Vehicle. These features include four antenna bases on the turret (rather than the two for the infantry section vehicle), a double rear door of the Warrior section vehicle prototype, which was replaced by a single power-operated door for the production version of the section vehicle, and the two antenna masts mounted on either side of this door. On the right side of the vehicle the heater outlet louver hatch is missing since on the command version the auxiliary diesel heater is replaced by a small generator that does not need an outlet because its exhaust merges into the engine exhaust outlet.



"Cleopatra" was one of the first Warrior FV511 Infantry Command Vehicles ever delivered. It belongs to the 1st Battalion, Grenadier Guards, which in 1988 was the first operational Warrior-equipped infantry unit of the British Army. Here the vehicle is seen during Exercise "Key Flight 1989" when the 1st Bn, Grenadier Guards belonged to the "Red Forces", who provided the OPFOR for 20 Armoured Brigade. In their role as the enemy, the Warriors of the unit were marked with squares made of red tape.



The rear view of another Warrior FV511 Infantry Command Vehicle of the Grenadier Guards shows off the double rear door of the vehicle and the antenna masts mounted to either side of the door. The vehicle, which belongs to the company commander of C Company, 1st Bn, Grenadier Guards, was a participant in Exercise "Key Flight 1989".

Mounted inside the troop compartment of the Warrior FV511 Infantry Command Vehicle are two folding tables, together with four folding seats, map boards, and the vehicle's radio equipment. The FV511 Infantry Command Vehicle radio equipment can vary according to its task either as a battalion HQ vehicle or a company HQ vehicle. A battalion HQ vehicle is fitted with two VRC 353 and one PRC 351 Clansman radios. In a battalion commander's vehicle, these can be operated as follows: VHF secure brigade command net, VHF insecure battle group command net and HF insecure alternate battle group command net. The company commander's vehicle fields two VRC 353 and one PRC 320 for communication on the battle group net and the company net. Since the information provided by former Warrior personnel varies widely regarding the actual radios fitted to the command vehicles, it is most likely that these are mounted by the signal section of the respective battalion chosen to meet the task of the unit.



This close-up illustrates well the only difference between the turret of the Warrior FV511 Infantry Command Vehicle and the Warrior FV510 section vehicle – the two additional antenna mounts. Note that the storage boxes on the side of the turret are missing on this early Warrior FV511 Infantry Command Vehicle version. These boxes were later introduced for the command vehicle versions, but were also soon adopted by infantry section vehicles since space is always limited inside armored fighting vehicles.



Belonging to the CO of B Company, 2nd Bn, The Royal Regiment of Fusiliers, this Warrior FV511 Infantry Command Vehicle provides a good view of the split rear door. A similar door was also used on the section vehicle prototypes of the Warrior, but it was replaced for the production version by a single-piece power-operated door. Note that only one antenna mast is fitted to the vehicle's rear.



Just like infantry section vehicles, the Warrior FV511 Infantry Command Vehicle are fitted with the DFWES laser duel system during exercises. Clearly visible are the loudspeaker, which produces the sound of weapons firing, the laser firing device, and the receptors. This picture was taken during Exercise "Ulan Eagle 1999". The vehicle belongs to the CO of B Company, 2nd Bn, The Royal Regiment of Fusiliers.



Here the CO of the 2nd Bn, The Royal Regiment of Fusiliers uses his Warrior FV511 Infantry Command Vehicle as map board at a briefing during Exercise "Ulan Eagle 1999".

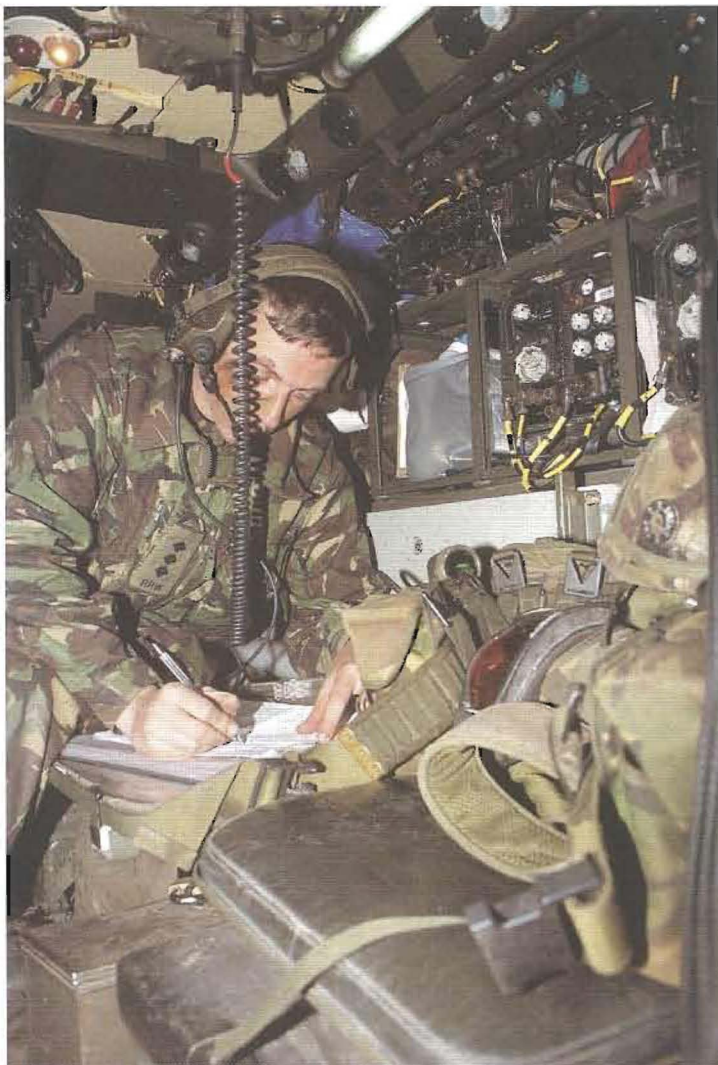
While 146 Warrior FV511 Infantry Command Vehicles were originally ordered, after "Options of Change" only 84 were finally built and delivered to the British Army. The vehicles left Telford with the radio harness fitted, but the radios were added at the depot level before the vehicles were delivered to the units. Each armored infantry unit of the British Army is equipped with nine Warrior FV511 Infantry Command Vehicles, one for the battalion commander and two for each of the three armored infantry companies and the fire support company, one for the company commander and one for his 2IC. The crew of the Warrior FV511 Infantry Command Vehicle consists of the driver, commander, gunner and three radio operators.



Photographed in early July at the Kosovo Polje train station in Kosovo, this Warrior FV511 Infantry Command Vehicle belongs to the company commander of A Coy, 1st Bn, The Green Howards. It is named after Lieutenant Colonel Derek Anthony Seagrim, who won his Victoria Cross on 21 March 1943 when the 7th Battalion of the regiment attacked the Mareth line. Note the Scorpion badge on the vehicle, the NATO badge and the add-on armor. Also note where the two radio antennas are situated at the rear of the turret: one in the center and the other on the right hand side.



This picture of the CO's Warrior FV511 Infantry Command Vehicle of B Company, 1st Bn, The Highland Fusiliers was taken during the first "Ulan Eagle" exercise in 1996. Note that the heater outlet louver hatch is missing from the right side of the vehicle. The red and white exercise badge, which was displayed on nearly every vehicle taking part in "Ulan Eagle 1996", is visible on the cover of the commander's Raven sight.



Here the company 2IC of the 1st Bn, The Royal Regiment of Wales works in the rear of his Warrior FV511 Infantry Command Vehicle during Exercise "Ulan Eagle 2000". Note the communications equipment in the vehicle, which consists of two VRC 353 and a PRC 320 mounted to his left. It appears that another radio is mounted next to the PRC 320, presumably a PRC 352. This is a good example of the variety of different combinations of radios mounted in Warrior FV511 Infantry Command Vehicles.



This side view of the CO's Warrior FV511 Infantry Command Vehicle from B Company, 1st Bn, The Highland Fusiliers illustrates the omission of the heater outlet louver hatch next to the fan outlet louver hatch and the additional radio mountings of the infantry command vehicle.



Here the Warrior FV511 Infantry Command Vehicle belonging to the CO of the 2nd Bn, The Royal Regiment of Fusiliers can be seen driving on a M-3 rig ferry of 28 Amphibious Engineer Regiment during Exercise "Ulan Eagle 1999" in Poland. The vehicle is fitted with the DFWES equipment, the receptors of which can be seen mounted on the vehicle's turret. It is interesting to note that for some reason in 1999 and 2000, Warrior FV511 Infantry Command Vehicles were seen that, like the vehicle on the picture, had one of the two rear-mounted antenna masts removed.

FV512 Mechanized Combat Repair Vehicle

The FV512 Mechanized Combat Repair Vehicle (MCRV), which is based on the Warrior hull and chassis, uses the same engine pack and transmission as the infantry section vehicle. The British Army received a total of 103 vehicles out of the 110 ordered in the original contract. The FV512 is used in the REME detachments of the armored infantry battalions, the armored regiments and the REME battalions. For example, an armored infantry battalion operates one MCRV in each of its three armored infantry companies. In addition, each company is equipped with one MRV(R). Another one belongs to the battalion's HQ company's Light Aid Detachment, bringing the total number of Warrior MRV(R)s and MCRVs in the battalion to seven. Situated at the left rear of the vehicle is a hydraulically operated crane, which is supported by a hydraulically actuated stabilizer leg that is lowered during the use of the crane. The 6.5-ton capacity of the 360° traversable crane allows the Warrior MCRV crew to lift and replace the power pack or some other similarly heavy parts belonging to the Warrior vehicle family, as well as larger fighting vehicles such as the Challenger 2.

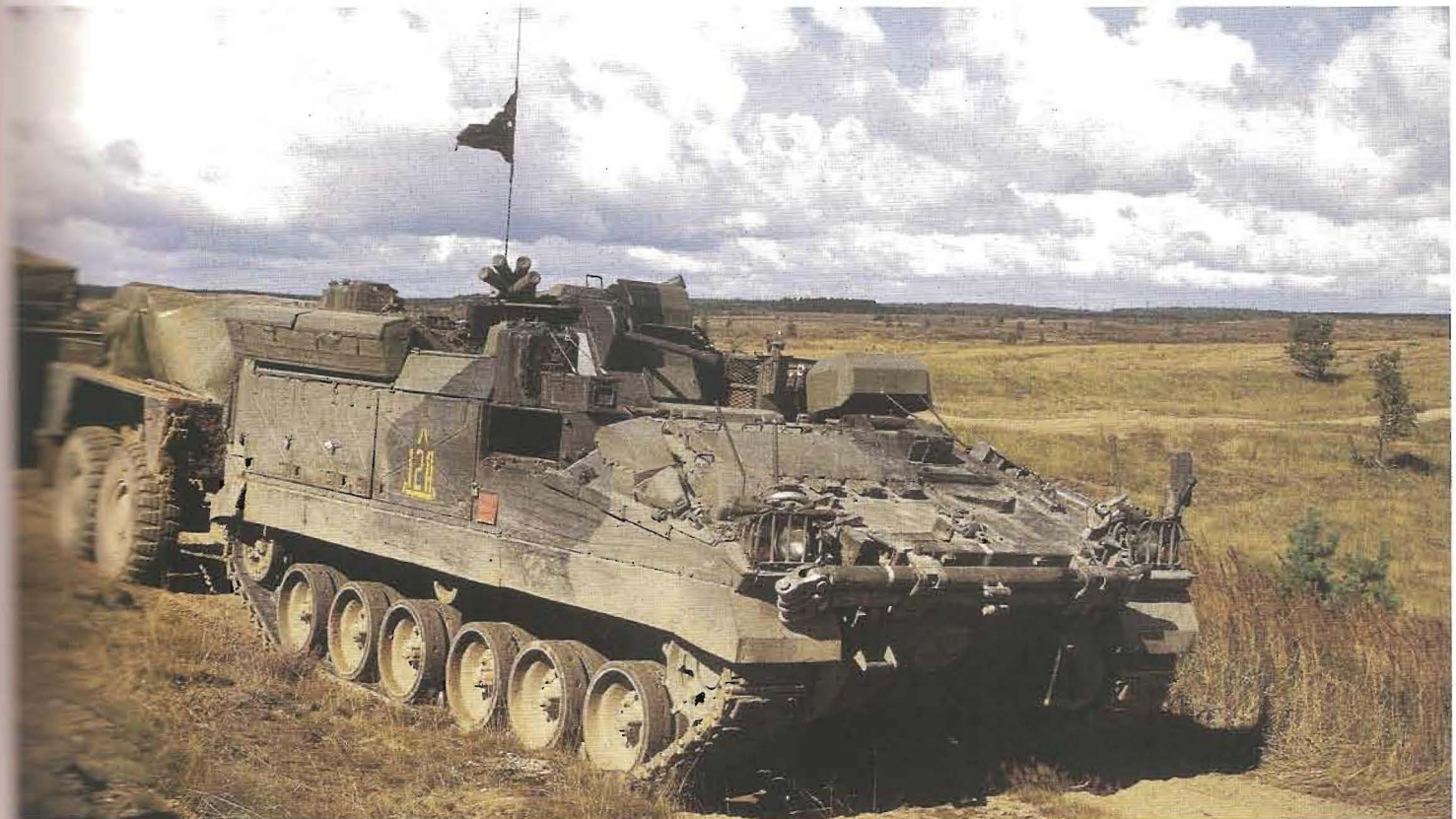
Situated inside the vehicle is a fully equipped workshop that includes power tools such as a power saw, a pneumatic hammer, a grinder, and a power screwdriver. The compressor for the hydropneumatic power tools is powered by a 3-cylinder Auxiliary Power Unit that also provides power to operate the crane. Also available inside the vehicle is a welding kit and a gas cutting kit. An electro-hydraulic pump allows the crew to change the engine pack of its own MCRV without external support. With a well-trained crew, the exchange of a Warrior power pack takes between 30 and 45 minutes. It must be mentioned, however, that this is under ideal conditions that include flat ground and connections that are easily removed.

For self-defense purposes, the vehicle is fitted with a manually operated one-man turret armed with a 7.62mm L94A1 Chain Gun, the same weapon used on the Warrior section vehicle as coaxial weapon to the



Seen in November 1988, this Warrior MCRV belongs to the 1st Bn, Grenadier Guards. This was the first unit to be declared operational with the Warrior in mid-1988, just a couple of months before this picture was taken during Exercise "Iron Hammer". The rear view of the vehicle clearly shows the hydraulic stabilizer in travelling position in the left rear corner. This provides stability when the crane is operating. Note the yellow triangle and "24B" markings that indicate that the vehicle is a part of the LAD of A Company. (Michael Jerchel)

30mm Rarden gun. On board the vehicle are carried 4000 rounds of 7.62mm ammunition for the machine gun. Also mounted on either side of the turret are two banks of four 76mm VIRSS smoke grenade dischargers. The MCRV crew consists of the driver, the commander and three REME technicians who travel in the troop compartment in the rear of the vehicle. The crew is protected by a collective NBC system, and an air-conditioning system provides them with some comfort.



An MCRV is seen in action during Exercise "Ulan Eagle 98" with a GKN Defence T4 High Mobility Trailer attached to its towing hook. The picture provides a side view of the Warrior's chassis, which consists of six road wheels, one double support guide roller, two track support rollers, double idler wheels, and a sprocket.



This Warrior MCRV belongs to 7 Close Support Company, 2nd Bn, The Royal Electrical and Mechanical Engineers, who are based in Fallingbommel, Germany. Note the open storage bins on the right side of the vehicle in which tools and spares are carried. Each REME battalion is equipped with six Warrior MCRV for second line support.



This REME MCRV has thrown its track in the greasy, sandy soil of Drawsko Pomorski training area during Exercise "Ulan Eagle 99" in Poland. It appears that the rear idler of the vehicle has been damaged since the crew has removed it. Mounted above the opened storage bins on the side of the hull are additional bins that look like they have been taken from a Chieftain MBT. Visible in the right rear background is an MRV(R), the companion of the MCRV. Along with an FV432, visible in the rear left background, the two vehicles form the LAD section of an armored infantry company.



Shown at the Staff College Demonstration of the 3rd Armoured Division in Sennelager in May 1992, this Warrior MCRV belongs to the 2nd Bn, The Royal Anglian Regiment. The vehicle's crane is extended to its full length of 4.52 m (15 feet), and the stabilizer leg can be seen in use. Note the remote control unit placed on the ground beneath the stabilizer. When in use, the crane is able to lift a weight of up to 6.5 tons, which is more than the weight of a Warrior or Challenger power pack.



This close-up shows the manually operated one-man turret armed with a 7.62mm L94A1 Chain Gun, which is mounted on both the MCRV and the MRV(R). Alvis also mounted the turret on the Warrior Utility Vehicle prototype. Four thousand rounds of 7.62mm ammunition are stored inside the vehicle for the chain gun. Note the workshop-fitted ammunition box which provides extra storage space for the belongings of the crew, and the jerry can racks. It is quite common for crews in the British Army to modify vehicles to fit their personal operational requirements.



Here a Bedford TM 4-4 fuel tank refuels a Warrior MCRV of the Queen's Royal Lancers during Exercise "Ulan Eagle 98" at the Drawsko Pomorski training area. The upper half of the sectioned rear door of the vehicle opened and the seated crew is visible inside. The Warrior MCRV has a fuel capacity of 770 liters (203 gallons), which enables the vehicle to travel a road range of 500 km (311 miles). Visible on the vehicle's roof to the rear of the crane is an engine-lifting beam.



Here a Warrior MCRV follows a column of Challenger MBTs of the King's Royal Hussars. Behind the MCRV may be seen some CVR(T)s of the battle group's reconnaissance platoon. The cross-country ability and speed of the MCRV are the same as that of the Warrior infantry section vehicle, which allows the vehicle to easily follow the fighting elements of the battle group. Note the towing bar, recovery kit and jumper cable stored on the engine deck of the vehicle.



Photographed in Vitez in central Bosnia in April 1993, this MCRV belongs to the 1st Bn, The Cheshire Regiment. Apart from the Gulf War, the deployment to Bosnia was the second in which all vehicles of the Warrior family proved very reliable. However, the MCRV of the battle group were kept busy with recovery operations, as the icy roads often made 30-ton sledges out of the Warrior infantry fighting vehicles. Even though they usually were not damaged, they still needed recovery. Note the crane of the vehicle and the engine-lifting beam.



Here the crew of a Warrior MCRV of 7 Close Support Company, 2nd Bn REME are seen during Exercise "Ulan Eagle 2000" at the Drawsko Pomorski training area. They are using the vehicle-mounted 6.5-ton crane to lift a Challenger 2's power pack from the T4 High Mobility Trailer in tow. The crane is operated by the use of a wire-connected control pad that allows the operator to work with high accuracy.



Besides the Warrior MCRV, the British Army also ordered 45 GKN Defence T4 High Mobility Trailers, one of which is seen here behind an MCRV of the 1st Bn, Royal Tank Regiment during Exercise "Taurus Canter" in 1991. The trailer, which is equipped with quick-release mounting points, can carry one Challenger or, as seen in the photo, two Warrior power packs. The trailer is also fitted with an air brake system.

FV513 Mechanized Recovery Vehicle (Repair) (MRV(R))



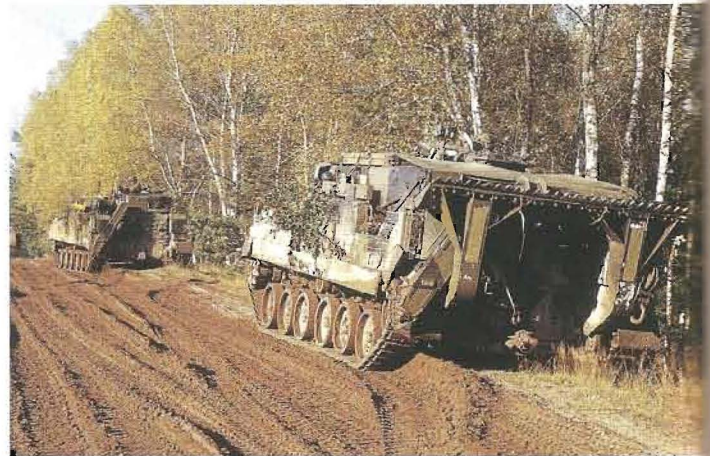
This FV513 MRV(R) from the 1st Bn, The Royal Highland Fusiliers was photographed at Exercise "Ulan Eagle" in 1999. The manually operated one man turret armed with a 7.62mm L94A1 Chain Gun can be seen behind the crane of the MRV(R). Inside the FV513 MRV there are 4000 rounds of 7.62mm ammunition stored for the weapon.

The second REME version of Warrior in service with the British Army is the FV513 Mechanized Recovery Vehicle (Repair), which is mostly identical to the FV512 Warrior Mechanized Combat Repair Vehicle. The main difference is the hydraulically operated winch located in the rear of the vehicle. This has a capacity of 20 tons, which can be increased to 38 tons by double reeling the cable. Used with a single line,

the winch has enough cable length to be used to a distance of up to one hundred meters (109.3 yards). The winch provides the vehicle with a notable recovery capability that is missing from the Warrior FV512 MCRV.



During the 7th Armored Brigade exercise "Ulan Eagle 1996" in Poland, the 2nd Bn, The Royal Regiment of Fusiliers acted as the enemy forces, displaying red crosses on their vehicles, as may be seen on this Warrior FV513 MRV(R). Here vehicles of the 2nd Bn, The Royal Regiment of Fusiliers employ a PP 64 folding pontoon ferry provided by the Polish 1st Engineer Brigade to cross one of the countless water obstacles at the Drawsko Pomorski training area.



The armored infantry battalions of the British Army are the only units equipped with the FV513 Warrior Mechanized Recovery Vehicle (Repair). One of these vehicles belongs to the HQ of the battalion's LAD. The remaining three are attached, one each, to the three armored infantry companies of the battalion. In addition, each battalion has three FV512 MCRVs, bringing the total number of Warrior REME variants in an armored infantry battalion to seven. These REME Warriors belong to a LAD section of an armored infantry company. The vehicle in the foreground is an FV513 MRV(R), and in the distance an FV512 MCRV can be identified by the absence of the earth anchor.



Named "Tobruk", this Warrior FV513 MRV(R) is one of three belonging to the 1st Bn, The Royal Regiment of Wales. It is seen here using the A-frame recovery bar to assist in the recovery of a Warrior infantry fighting vehicle during Exercise "Ulan Eagle 2000" in Poland.

One of each of the two REME versions is available in infantry companies. The most recognizable feature of the FV513 MRV(R) is the rear-mounted earth anchor, which when lowered provides additional support during recovery operations. Like the FV513 MCRV, the FV513 MRV(R) is also fitted with a suspension lockout system in order to provide additional stability when using the vehicle-mounted crane or recovery equipment. The earth anchor is lowered and lifted by a pilot winch. With a capacity of 1250 kg (2756 lb) and 200 m (656 feet) of cable, the anchor can also be used for other duties.

Like its brother, the FV513's interior houses a fully equipped workshop with power tools, a welding kit and a gas cutting kit. The compressor for the hydropneumatic power tools is powered by a 3-cylinder Auxiliary Power Unit that also provides power to operate the 6.5-ton crane. The crew of the vehicle consists of the driver, the commander and three REME technicians. The latter sit on the right side of the rear troop compartment of the MRV(R). Like the FV512 MCRV, the FV MRV(R) is fitted with the GKN Defence-designed one-man manually operated 7.62mm L94A1 Chain Gun turret. While originally 64 Warrior FV513 MRV(R)s were ordered, defense cuts under "Options of Change" reduced this number to 39 vehicles, the last of which were delivered by 1990.



A Warrior FV513 MRV(R) belonging to the 1st Bn, The Coldstream Guards is seen just after the vehicle's 6.5-ton crane was used to extract a heavy pack from a Warrior FV511 Infantry Command Vehicle. The hydraulically operated stabilizer leg is lowered to provide a more stable platform for the operation of the crane. To prevent the base plate of the stabilizer from sinking into the soft soil of the German training area, the opposing beam is being used as a kind of base plate. Note the countless tools, including the variety of tools from among the many that are carried on the FV513 MRV(R). The removed engine deck of the command vehicle is among the numerous other parts that were removed in order to allow the heavy pack to be lifted. (Simon Dunston)



When armored infantry units are deployed on operations, they always deploy their REME LAD as well. Here a Warrior FV513 MRV(R) of the 1st Bn, The Green Howards is seen on the plains of Bosnia during the unit's assignment to SFOR in Bosnia in April 1997. The picture provides a good view of the rear-mounted earth anchor, as well as the winch equipment. Note the base plate for the crane stabilizer stored on the vehicle's side.



Another view of a Warrior FV513 MRV(R) taking part in Exercise "Ulan Eagle" in 1999. This vehicle belongs to the 1st Bn, The Royal Highland Fusiliers. Note that the vehicle's call sign "24B" is painted in light grey. The colors of the call signs vary. Some armored infantry units paint them yellow, others light gray. The same variety can also be found among armored regiments using Challenger 1 and 2 main battle tanks.



This photograph was taken in January 1989. It shows the overhead view of the prototype of the Warrior FV513 Mechanized Recovery Vehicle (Repair). Clearly visible are the one-man turret mounted slightly off center, the mounting of the crane, the split hatch of the troop compartment, as well as the engine deck, which has the same layout as those of the Warrior infantry versions. (Michael Jerchel)

Also taken in January 1989, this photo shows the Warrior FV513 Mechanized Recovery Vehicle (Repair) during trials with the REME LAD of 1st Bn, Grenadier Guards, which was then based in Germany. The vehicle can easily be identified by the white number plate "00NC69". Even with some smaller modifications carried out later on, the vehicle remained basically the same as the production versions. (Michael Jerchel)



Like all Warriors of the Combined Arms Training Center (CATC) battalion at Warminster, the unit's FV513 MRV(R)s are also painted in sand yellow and dark green. The photo shows a vehicle of the 2nd Bn, The Royal Anglian Regiment during an exercise at Salisbury Plain in autumn 1999, when the unit provided the OPFOR. (Simon Dunstan)

FV514 Mechanized Artillery Observation Vehicle (MAOV)



Equipped with their Warrior MAOV, the FOOs are the eyes and ears of the artillery. Here a well-camouflaged Warrior MAOV can be seen in Poland engaging in one of the "Ulan Eagle" series exercises. While the observation officer uses his binoculars to observe enemy movements, his assistant observer transmits target data to an AS 90 battery FDC using one of the vehicle-mounted or man-packed radios, the antenna of which is visible on the turret. The FOOs with their Warrior MAOVs operate together with the combat elements of the battle group on the FLOT. This way they are 15 to 20 km (9 to 12 miles) ahead of the AS 90 gun positions. This Warrior MAOV of 25 Regiment, Royal Artillery has its mast erected with MSTAR mounted on top.

The British Army received a total of 52 FV514 Mechanized Artillery Observation Vehicles (MAOV), which were issued to the Forward Observation Officers (FOOs) of the field artillery units of the Royal Artillery and the Royal Horse Artillery. Each artillery battery of these regiments can field three MAOVs. Since the FOO are the eyes and ears of the artillery, they are prime targets for enemy fire. For their protection the MAOV looks nearly the same as a Warrior of the infantry. This makes it quite difficult for the enemy to recognize the FOO within a column of vehicles from a Warrior-equipped infantry company. British artillery terms reference the MAOV as Observation Post Vehicle. The gun of the MAOV is a wooden dummy fitted in place of the Rarden gun to make space in the vehicle turret to allow for the mounting of the MAOV's surveillance and fire control equipment. For self-defense, the 7.62mm L94A1 Chain Gun remained in the turret of the vehicle, and the MAOV is equipped with LAW 94mm anti-tank weapons.

The FOO's surveillance and fire control equipment consists of a Pilkington Optronics Osprey combined day/thermal/laser sight with a x1 magnification for the FOO. The second observer operates the



Visible on the turret of this Warrior MAOV of 3rd Regiment, Royal Horse Artillery are the DFWES receptors, which assess the notional damage inflicted by the main armaments of other vehicles that are fitted with a laser-firing device. Of course, since the gun of the MAOV is only a dummy, no laser-firing device is mounted above the barrel. The erected MSTAR mast can be seen at the rear of the vehicle. This Warrior MAOV is shown during Exercise "Ulan Eagle 1999". All command vehicle versions of Warrior, as well as the MAOV, are fitted with an additional storage box on each side of the turret. One may be seen on the right turret side of this vehicle. Originally this was a good recognition feature, but today a lot of infantry section vehicles are also fitted with such boxes by their crews in order to provide more storage space. This makes identification more difficult.

Pilkington Optronics Raven day and night sight and a remote display for the thermal imaging system. Also fitted inside the vehicle are the Battlefield Artillery Target Engagement System (BATES), an internal land navigation and attitude reference system called APES (Azimuth Positioning Elevation System), and Racal's Manportable Surveillance and Target Acquisition Radar (MSTAR). MSTAR is a pulse doppler J-band surveillance and target acquisition radar used to detect and acquire moving targets up to 20 km (13 miles). MSTAR can be raised to a height of 2 meters (6.5 feet) above the roofline by using a mast mounted at the rear left side of the vehicle, or it can be deployed remotely.

The extensive communication equipment of the MAOV comprises three VRC 353, of which one is a VRC 353 Z and one a PRC 351, which are linked to the four turret-mounted antennae. The VRC 353 radio, which can be operated between 30 to 75,975 MHz, has a range of 32 km (20 miles) over which voice, digital data, facsimile, and radio teletype messages can be transmitted. The PRC 351 operates on the same frequency as the VRC 353 but has a much smaller range of 8 km (5 miles). Transmissions can be done in voice or digital data. The MAOV crew



This rear view of a Warrior MAOV shows the split rear door that opens to either side of the vehicle and is identical to the door in the infantry command vehicle version. Visible above the door is a storage grating, as well as the armored boxes in which the erectable mast is stored when not in use; these are situated to the left and right of the door.



An FOO is hard at work inside a Warrior MAOV. He is looking through his Pilkington Optronics Osprey combined day/thermal/laser sight with its x1 and x8 day magnification. The remote display for the assistant observer's thermal imaging system is visible in the left foreground.

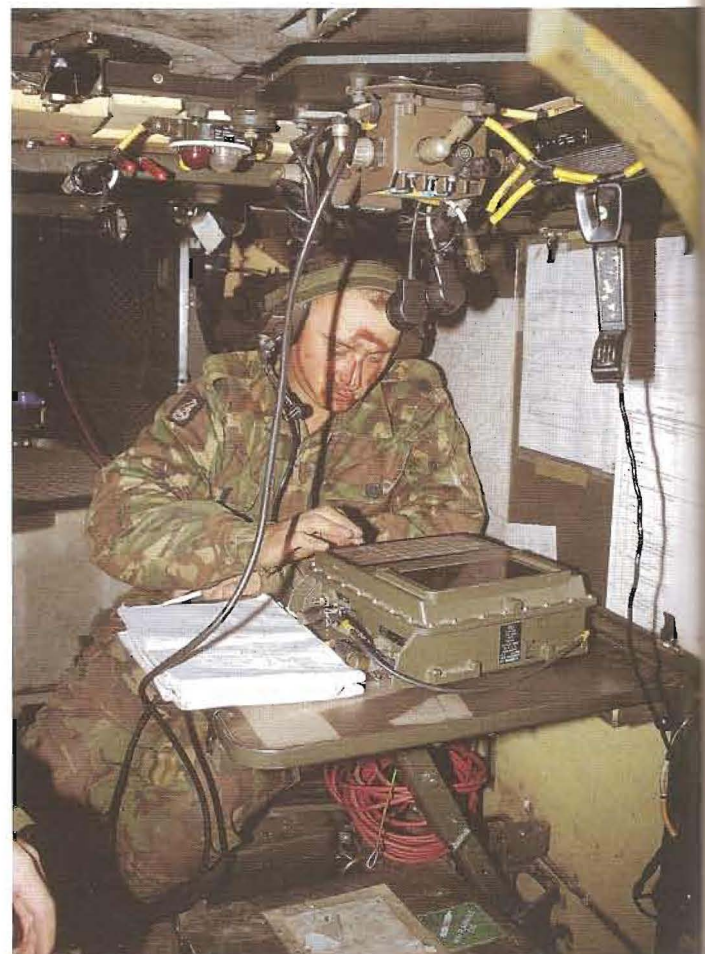
consists of the driver, the FOO, the assistant observer in the turret, and the three-man MSTAR team in the rear compartment, which operates the radar and communication equipment of the vehicle.

The first MAOV prototype was completed and tested in 1988. Following trials, a quantity of 95 was ordered. This number was later reduced to the 52 vehicles that were finally delivered. Since the time they came into service in 1990, Warrior MAOVs have seen service in the Gulf War, Bosnia and Kosovo. The first vehicles were delivered to the Army ahead of the schedule to allow their use by artillery units during the liberation of Kuwait. This was only possible due to the support of GKN, Pilkington and other involved manufacturers who made sure that troops were trained on the vehicles before they were sent into battle.

Here a member of the MSTAR team feeds target data into the Battlefield Artillery Target Engagement System (BATES). He is seated in the troop compartment of a Warrior MAOV, in which map boards and two folding tables are mounted. Just as in the MAOV, BATES is also available in the FDC, the gun position and the quartermaster's vehicle. Stored inside the computer system are all necessary data on the guns, weather, the gun position, and so on, including the amount of available ammunition. Once the data of a target is added, the computer calculates the fire command, including elevation, bearing and charge, which is then transmitted to the guns and shown to the crew in the AS 90 on a screen similar to the one in the FOO vehicle.

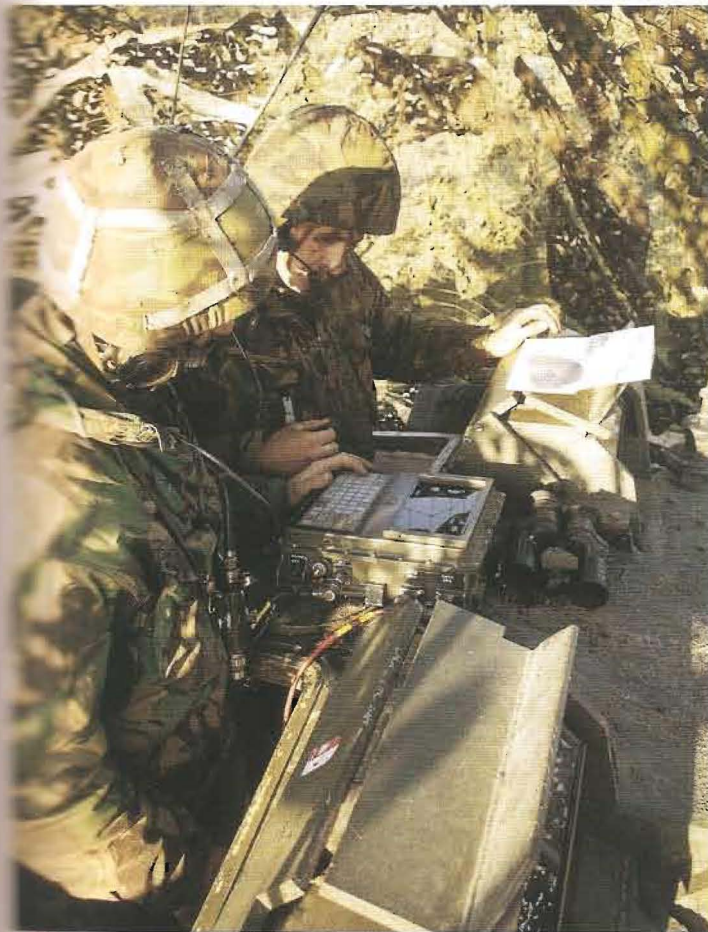


This close-up shows an MSTAR pulse doppler J-band surveillance radar mounted on the mast of a Warrior FV4320 Mechanized Artillery Observation Vehicle.





MSTAR is a pulse doppler J-band surveillance and target acquisition radar used to detect and acquire moving targets such as infantrymen, vehicles and helicopters up to a range of 20 km (13 miles). In addition, the radar is able to assist the FOO in detecting the fall of shot. On the control console, the electro-luminescent display that shows dead ground relief and the target track history also has the ability to superimpose a map grid in 1:50000 scale to ease the transfer of information to military maps. In the dismantled state, the MSTAR radar and the tripod have a weight of 35 kg (77 lb) and can be broken down into three sub-units and a tripod. The elements of MSTAR, namely the sensor, the RF head and main electronic assembly, and the control and display unit can be assembled in three minutes. Here MSTAR is being operated dismounted in front of a Warrior MAOV by soldiers of 40th Regiment, Royal Artillery "The Lowland Gunners" during live firing at the Munster ranges in 1996.



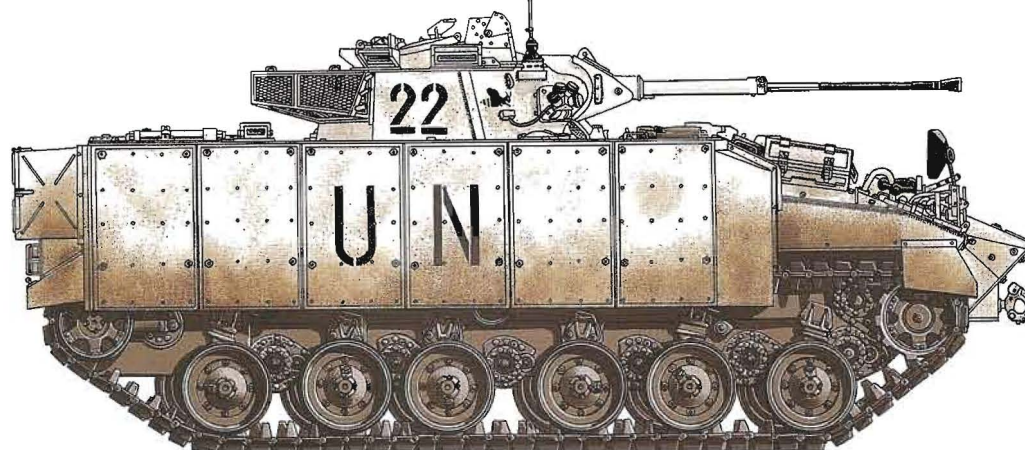
With their BATES terminal between them, an FOO and his second observer feed data into the computer system during a live-firing exercise of the 40th Regiment, Royal Artillery in Munster. Note that the covers of the FOO's Pilkington Optronics Osprey combined day/thermal/laser sight and the second observer's Pilkington Optronics Raven day and night sight are in the open position.



In the British Army battle group ORBAT, each squadron or company group would be supported by a FOO with a Warrior MAOV. The FOO is responsible for fire planning and directing the artillery fire on enemy targets in support of defensive action or attack. Thanks to the radio equipment of his Warrior, the FOO is constantly in contact with the company he is supporting, the Fire Direction Center (FDC) of the artillery regiment, the battery commander at the battle group HQ, and the gun positions. The wooden dummy gun is missing from this Warrior MAOV. Most likely the "gun" was simply lost accidentally during Exercise "Ulan Eagle 2000" since this picture was taken while 3rd Regiment, Royal Horse Artillery prepared to load onto trains during its redeployment from Poland to Hohne in Germany.

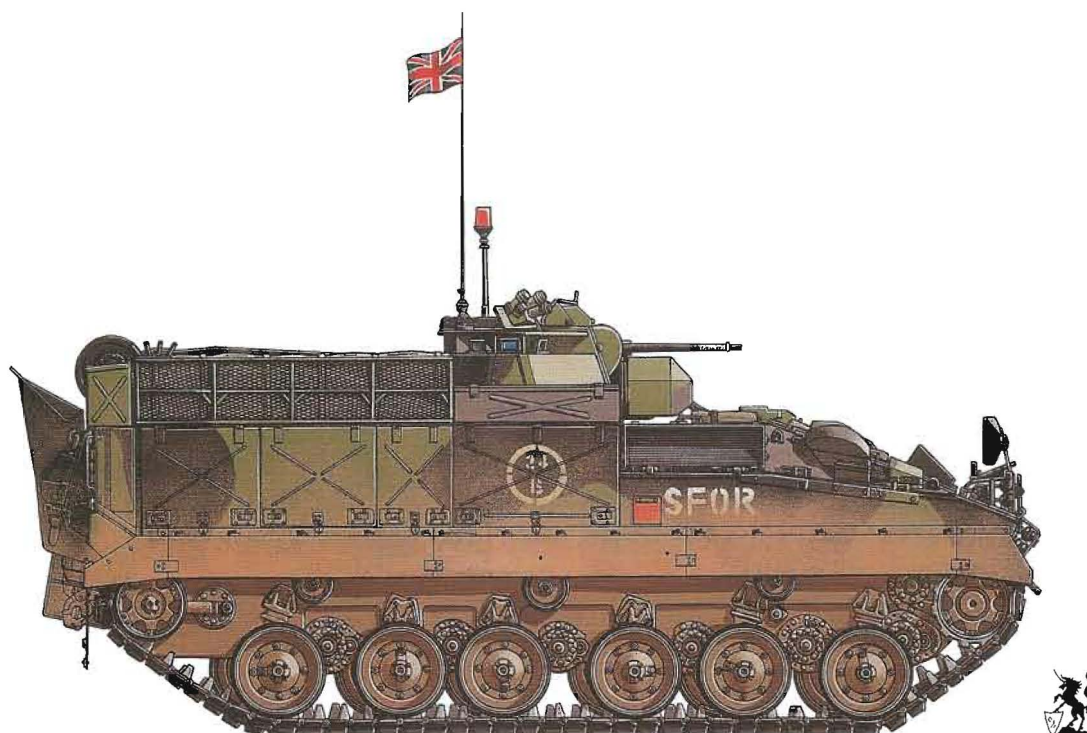


Belonging to 26 Regiment, Royal Artillery based in Gütersloh, Germany, these two Warrior MAOVs were deployed to Exercise "Ulan Eagle 2000". A crew member can be seen in front of the first Warrior MAOV operating OTIS, a combination of multi-role thermal imager, laser range finder and angulation head, which belongs to the surveillance equipment carried on the vehicle for dismounted use. The Warrior MAOV in the rear has its MSTAR mounted on the vehicle-based erectable mast. Other vehicles of an armored battle group, including a Scimitar CVR(T), a Warrior section vehicle and a Starstreak HVM, are visible in the background.



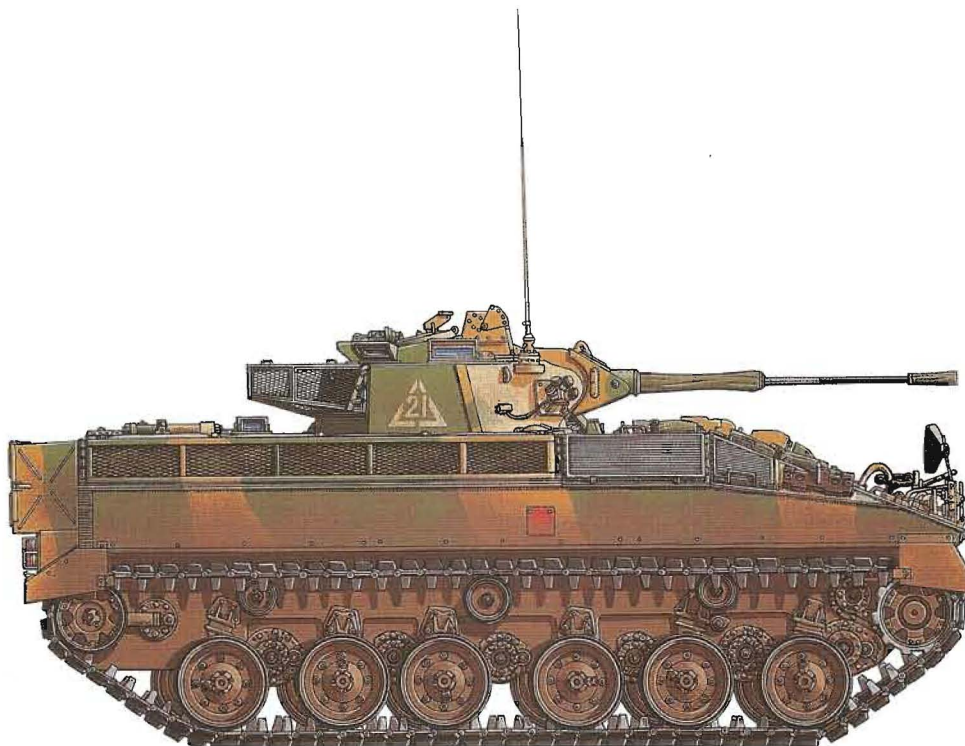
Warrior FV510 Infantry Section Vehicle of 2nd Platoon, B Company, 1st Bn, The Cheshire Regiment belonging to UNPROFOR, December 1992, in Vitez in central Bosnia

The vehicle is fitted with the passive add-on armor that was used on all infantry Warriors deployed to Bosnia. It is painted in the standard United Nations color scheme, and the UN identification can be seen painted in black on the side of the vehicle. The UN letters are also painted on the front panel of the add-on armor and on the storage bin on the rear left side of the vehicle. Painted on the turret sides of "Call Sign 22" is the "armed wasp" insignia that was seen on all Warriors from B Company during the unit's UNPROFOR deployment in 1992/93.



Warrior FV513 Mechanized Recovery Vehicle (Repair) of REME LAD, C Company, 1st Bn, The Green Howards belonging to SFOR, April 1997, near Banja Luka in central Bosnia

The vehicle is painted in the standard green and black camouflage pattern used by the British Army throughout Europe. For easy identification the letters SFOR, the abbreviation for Stabilization Force, are painted in white on the side. While the infantry variants were fitted with an additional armor package, the REME versions were not. Note the Union Jack flying from the antenna of the vehicle, a common practice of British troops deployed on peacekeeping operations to identify their nationality.



Warrior FV510 Infantry Section Vehicle of 2nd Platoon, A Company, 2nd Bn, Royal Anglian Regiment as CATC Battalion at Salisbury Plain during Exercise "Phantom Bugle 1998"

Like the vehicles used at BATUS in Canada, the vehicles of the CATC-attached armored infantry battalion of the School of Infantry at Remington are painted in a sand yellow and green camouflage pattern to make the identification of OPFOR and friendly forces easier.



Warrior FV511 Infantry Command Vehicle of the 2 IC of C Company, 1st Bn, The Royal Regiment of Wales during Exercise "Ulan Eagle 2000", September 2000, Drawsko Pomorski training area in Poland

Painted in the standard green and black camouflage pattern, the vehicle can be identified as belonging to a Welsh Regiment by the flag flying from one of the antennae. Painted on the side of the vehicle is the word "Brecon", the name of a town in Wales. During the exercise, all other vehicle variants of the battalion were seen bearing names of towns and other places in Wales, such as the following: MERTHYR, TYDFIL, BANGOR, NEWBRIDGE, TRECASTLE, RISCA, PONTYPOOL, ABEDARE, and PENTREBANE.

FV515 Battery Command Vehicle (BCV)



This side view shows the Warrior FV515 Battery Command Vehicle of 88 Arracan Battery, 4 Regiment, Royal Artillery during Exercise "Ulan Eagle 2000". Note that the only identification feature that distinguishes the vehicle from the Warrior FV514 MAOV is the unarmored rear storage box, which replaced the MAOV armored box for the MSTAR mast.



At his post in the troop compartment of a Warrior FV515 BCV, one of the radio operators mans one of the three vehicle-mounted VRC 353 radios that belong to the Clansman radio equipment range. The VRC 353 radio can be operated between 30 to 75,975 MHz and has a range of 32 km (20 miles) over which voice, digital data, facsimile, and radio teletype messages can be transmitted.



Following extensive live firing on the Munster ranges in Germany, a Warrior FV515 BCV leads a column of other vehicles, including a Warrior FV514 MAOV and a FV432 of a battery HQ of 40 Field Regiment, Royal Artillery "The Lowland Gunners". Clearly visible are the four antennae of the radio equipment of the vehicle, which is identical to that of the Warrior FV514 MAOV.



Sticker of the badge of 88 Arracan Battery, 4 Regiment, Royal Artillery displayed on the turret-mounted storage box of the battery's Warrior FV515 BCV. The badge was also seen on the battery's Warrior FV514 MAOV and the unit's AS 90 gun during Exercise "Ulan Eagle 2000"

The Warrior FV515 Battery Command Vehicle is the second Warrior variant issued to the Royal Artillery. Under the original contract, 35 FV515 BCVs were ordered, but this number was reduced to the 19 vehicles finally delivered. The first Warrior FV515 production vehicle left the manufacturing line in Telford and was issued to the British Army in 1990. The function of the vehicle is to act as a mobile command post for the battery commander of a field artillery battery. Each AS 90 battery in the British Army is issued one FV515 BCV.

Since the artillery battery commander assists the battle group commander in questions related to indirect fire support, he is usually situated in the battle group HQ. When the battle group commander follows the battle in the field with his own vehicle, the battery commander follows him in his Warrior FV515 BCV. In wartime, the AS 90-equipped Field Artillery Regiments of the British Army consist of four gun batteries, each with one Warrior FV515 BCV and three Warrior FV514 MAOVs, bringing the total number of Warriors in a regiment to sixteen. In wartime, on operations and during exercises, these Warriors operate along with the

combat elements of the battle group, which also provide all types of logistical support to the artillery asset. This includes maintenance provided by the highly skilled and Warrior-trained REME technicians with the Warrior MRV(R) and Warrior MCRVs. In peacetime and on barracks duty the artillery lacks this support as there are no variants of REME Warriors available in the artillery regiments, which can cause difficulties.

The Warrior FV515 BCV is a less expensive version of the Warrior FV514 MAOV. Designed for the battery commander and his duties, it lacks most of the FOO's surveillance and target acquisition equipment. Like the MAOV, it has a dummy gun and is armed with only the 7.62mm L94A1 Chain Gun. In exchange for the FOO's Osprey sight, the vehicle is fitted with two Raven day/night sights like the infantry vehicles. What BATES is mounted in the BCV, surveillance kit such as MSTAR is missing. According to the statement of a Royal Artillery battery commander regarding the communication equipment, the radio equipment of the BCV is identical with that of the MAOV.

The Gulf War- Warrior's First Operational Deployment

The invasion of Kuwait by Iraqi forces in August 1990 led to the largest deployment of British forces into a theater since the Second World War. In September 1990 it was announced that 7th Armoured Brigade was to join the allied forces in Saudi Arabia. Later, in November 1990, it was also announced that 4th Armoured Brigade and HQ 1st (UK) Armoured Division, and divisional troops such as artillery and reconnaissance troops, would bolster the British troops in the Gulf under the code name of Operation "Granby". Most of the British forces deployed were drawn from units situated in Germany. After the announcement of the contribution, units became busy packing, repainting vehicles in desert camouflage and conducting final training, including extensive live firing on the Bergen training ranges. The first British troops departed from Germany on 11 October.

A total of 35,000 British troops were deployed between September 1990 and the beginning of hostilities between the coalition forces and the Iraqi armed forces on 16 January, 1991 when the air war started. While the troops flew in by plane, all of the more than 5000 vehicles were shipped to Saudi Arabia and arrived in Al Jubayl port. Among these were the Warriors for the three British armored infantry battalions deployed, namely:

- 1st Bn, The Staffordshire Regiment (re-enforced by a company of 1st Bn Grenadier Guards) forming part of 7th Armoured Brigade
- 1st Bn, The Royal Scots (re-enforced by a company of 1st Bn Grenadier Guards) forming part of 4th Armoured Brigade
- 3rd Bn, The Royal Regiment of Fusiliers (re-enforced by a company of 1st Bn Grenadier Guards) forming part of 4th Armoured Brigade



Belonging to the 1st Bn, The Royal Scots, this Warrior FV510 Infantry Section Vehicle is a perfect example of the appearance of the vehicles during the Gulf War in early 1991. All Warriors were painted in desert yellow camouflage colors and had passive armor added to their hull. Storage baskets were fitted to the armor panels to hold additional belongings such as jerry cans containing water, boxes with Compo rations, etc. Rucksacks, tents and other equipment stored on the outside of the vehicle were wrapped into CARM. Note that the officer in the foreground wears an NBC suit in DPM rather than in desert camouflage, over which he carries the newly introduced Combat Body Armor. Interestingly, a huge number of troops were sent to the Gulf wearing their DPM clothing and only received desert uniforms shortly before the ground war began due to a shortage in the clothing chambers of the MoD. (MoD via Simon Dunston)



Operation "Desert Sabre", which was the ground offensive of the allied forces, took place between 24 and 28 February 1991. Here vehicles and crews of the 1st Company, 1st Bn, The Staffordshire Regiment are seen during final preparations just hours before the unit set off into Iraqi territory. The troops are wearing their NBC suits to protect themselves against the threat of the enemy's chemical weapons. Visible on the vehicles is the black inverted "V", the identification feature of the allied forces; it was only applied at the last minute. Note the covers on headlights of the first vehicle, which are designed to defuse enemy night vision. (MoD via Simon Dunston)



These Warrior FV510 Infantry Section Vehicles are ready for the ground offensive, being fitted with passive add-on armor, and their crews' equipment is stored all over the vehicles. The photo was taken as they rehearsed a platoon attack. Note that the inverted "V" is not yet painted on the vehicle hull as this was done shortly before the troops entered into Iraq. However, the picture gives a good impression of how Warriors attacking Iraqi positions might have rushed over the open desert. (MoD via Simon Dunston)



Warrior FV512 Mechanized Combat Repair Vehicles were deployed with the REME LAD detachments of the Challenger 1-equipped armoured regiments of 4th and 7th Armoured Brigade. This vehicle can be identified as belonging to 7th Armoured Brigade "Desert Rats" by the red jerboa "jumping mouse" badge painted on the vehicle hull. In fact, this means that it either belongs to the Royal Scots Dragoon Guards or the Queen's Royal Irish Hussars, the two armoured regiments of the brigade. (Yves Debay)



Here a small number of Warriors of the 1st (UK) Armoured division are seen live firing in the Saudi Arabian desert. In total, more than 250 Warriors of all variants existing during the Gulf War were deployed and used during the ground war. Note that some of the vehicles have already been fitted the Chobham add-on armor, while the two Warrior FV510 Infantry Section Vehicles in the foreground are still without it. (Yves Debay)

Additional re-enforcement personnel for the armored infantry units were drawn from various infantry units such as The Royal Anglian Regiment, The Royal Green Jackets and The Queen's Own Highlanders. The number of Warriors in the armored infantry units was increased from 52 to 69 by replacing the FV432s of the Milan platoon and the MFC parties with Warrior variants such as FV510 and FV511. Including Warrior FV512 MCRV, Warrior FV513 MRV(R) and Warrior FV514 MAOV, it is estimated that the number of Warriors deployed to the Gulf was well above 250 vehicles of the different variants.

Though during most of the training conducted by the British Forces in

the desert prior to the war Warriors were seen without add-on passive armor, during the war all infantry vehicles, as well as the artillery variants, were fitted with the Chobham-type armor. The Warriors used in the Milan platoon were fitted with a special conversion kit to allow the firing of a missile from the roof of the vehicle. Because there were not enough Warrior FV514 MAOVs available during the Gulf War, some Warrior FV510 Infantry Section Vehicles were used by the FOOs of the Royal Artillery. Other more general modifications included the fitting of G and maintenance-free batteries to nearly all Warriors deployed to Saudi Arabia.

By 31 January, 1st (UK) Armoured Division was declared operational, having reached its concentration area 60 km (37 miles) away from the Iraqi border. During the ground war, 1st (UK) Armoured Division formed part of the 7th (US) Corps with the mission to break out of an established bridgehead and push on to destroy the enemy's tactical reserve. With the air offensive having already started on 16 January, it was only a question of time before the ground forces would start their move to liberate Kuwait. The ground offensive started for the British troops on 24 February 1991, which was called "G-Day", with their movement to a staging area 12 km (12.4 miles) south of the obstacle belt constructed by the Iraqis, which they passed on G+1. During the night between 25 and 26 February, Warriors of A Company, 1st Bn, The Staffordshire were the first to see combat when the company supported an armored attack by the Royal Scots Dragoon Guards on objective "Copper" with their Challenger 1 MBTs in heavy rain and a sand storm. During this, the disembarking of the company was supported by their Warriors. During the next four days, 7th Armoured Brigade fought its way deep into Iraqi-held territory eliminating objectives "Zinc", "Platinum 1", "Platinum 2", "Lead", "Nickel", "Cobalt" and "Cobalt", with the latter already on Kuwaiti soil 30 km (19 miles) north of Kuwait City. In the meantime, 4th Armoured Brigade took objectives "Bronze", "Brass", "Steel", and "Tungsten" south of the axis of advance of 7th Armoured Brigade.

The offensive officially ended on 28 February at 0800, when a ceasefire went into effect, but Kuwait City was liberated earlier on 25 February. In the 100 hours of fighting, more than 200,000 Iraqis were killed and approximately 100,000 were killed. Of 42 deployed Iraqi tanks, 41 were smashed in the desert. During the operation, Warriors proved themselves to be reliable vehicles that offered the crew a high level of protection. This was illustrated well when one Warrior FV510 Command Vehicle was hit by a HESH round fired during a blue-on-blue contact by a Challenger 1 of the Scots DGs on 25 February at 1345 hours at objective "Platinum 1". The hull of the vehicle was dented under the Chobham armor plate that took most of the impact, but no member of the crew inside the vehicle was injured and the vehicle carried on to the



A Warrior FV510 Infantry Section Vehicle speeds over the desert during one of the countless desert warfare exercises conducted by the British troops while based in Saudi Arabia. For example, the last two exercises of 7th Armoured Brigade (Dibdibah Drive on 4 to 6 February and Dibdibah Charge on 14 to 16 February) were held just two weeks before the ground war started. They were used to practice a breakout from a bridgehead deep inside enemy territory, just as actually took place during Operation "Desert Sabre". (Yves Debay)

end of the campaign. In another case, a Warrior FV510 Infantry Section Vehicle of C Company, 1st Bn, The Staffordshire Regiment was hit by an RPG anti-tank grenade while the crew dismounted, leaving one infantryman dead and starting a fire in some equipment stored on the vehicle. This Warrior was also able to continue its mission. The 3rd Bn, The Royal Regiment of Fusiliers was not as fortunate when they lost two of their Warriors in a blue-on-blue attack of US A-10 Thunderbolt aircraft that destroyed the vehicles with Maverick missiles. Nine British soldiers died and one was seriously wounded in the incident.



Soldiers work to affix Chobham passive add-on armor onto Warriors of the Fire Support Company of the 1st Bn, The Staffordshire Regiment. This armor was added to vehicles by their crews with the assistance of the REME technicians just days before the ground offensive started. After the soldiers had finished handling and fitting the protection kit, vehicles were fitted in four hours rather than the originally estimated twelve. (MoD via Simon Dunston)

White Warriors with the UN in Bosnia



Guarding the bulk fuel installation of the Cheshire battle group in Vitez, this Warrior section vehicle belongs to A Company, the 1st Bn, The Cheshire Regiment in January 1993. To protect the driver from the freezing well-below-zero weather conditions while traveling, the vehicle is fitted with a driver's windscreen complete with perspex sidescreens. Note the "Ace of Spades" company badge painted next to the vehicle's call sign on the left side of the turret.



This close-up of a platoon commander's Warrior gives a good view of the receiver antenna of the mounted GPS. GPS was first seen mounted on Warriors during "Desert Storm". Since then it has become a must for navigation during operations. In addition, in Bosnia platoon commanders' vehicles were fitted with a PRC 320 HF radio to allow communication in the uneven Bosnian landscape, as well as additional power sockets for the use of the commanders' lap top computers. The commander's and gunner's sights are opened and allow a view of the Pilkington Raven day/night sight. Interesting details to note are the wipers, driver's periscope, mounted smoke dischargers, fuel intake, and the fitting tubes for poles that usually hide the camouflage net.

When the Warriors of the 1st Battalion, The Cheshire Regiment were unloaded in Split in Croatia on 11 November 1992, this marked the beginning of Warriors operating in the civil war-torn former Yugoslavia, which already had broken up into Slovenia, Croatia, Bosnia-Herzegovina, Macedonia, and Yugoslavia. The initial deployment of UN troops to the former Yugoslavia began in February 1992 according to UN Resolution 743 when forces were deployed to Bosnia and Croatia to carry out the "Vance-Owen Plan". The troops' task was to restore peace in Croatia by creating buffer zones between Serb and Croat forces, disarm militias, supervise the departure of the JNA, restore the communication network, and allow the return of refugees to their homes. Even though some of these aims could be achieved, the mission was mainly a failure since the UN forces lacked the power to deter the protagonists. The situation became



A Warrior of B Company, 1st Bn, The Cheshire Regiment in December 1992 near the front line in Turbe near Travnik, where Serb, Muslim and Croat forces clashed for the first time in 1992. Since then the fighting never ceased during the whole war. Speed, armor, firepower, and reliability made the Warriors of the British UNPROFOR forces the best-suited weapon system for the task of guarding and escorting aid convoys through the lines. The Chobham add-on armor is clearly visible here. Together with the hull of the vehicle, this often saved the lives of British soldiers operating in Bosnia. For example, every single Warrior of the 1st Bn, The Princess of Wales's Own Regiment of Yorkshire, who relieved the Cheshires in May 1993, was hit by enemy fire during the unit's six-month tour.

even worse when hostilities between Serbs on one side and Croats and Muslim on the other side flared up in Mostar and soon spread throughout all of Bosnia. This was the situation when the first British troops in the Warriors started to make their way to Tomislavgrad, Gornji Vakuf and Vitez in central Bosnia.

The main mission of the 1st Battalion, The Cheshire Regiment was to escort convoys, including convoys of UN and non-governmental



A platoon of four Warriors of the 1st Bn, The Cheshire Regiment escorts a convoy of Bedford trucks crammed with refugees through hostile lines of Serb and Muslim militia somewhere in the Vitez area. When escorting convoys, two of the Warriors did not carry dismounted weapons to allow the drivers of the soft-skinned vehicles to take shelter in the rear of the empty Warriors if the convoy came under fire and could not get through. Of course this was only done when the transported goods were human. Note the UN flag on the last vehicle. This addition became popular among British troops only when they were no longer allowed to fly Union Jacks from their vehicle antennas. Union Jacks were then used as stickers on the front and rear of the vehicle since it was thought that flying large national colors did not reflect the UN spirit and impartiality of UN forces.

humanitarian help organisations. In addition to 45 Warrior section vehicles and Warrior infantry command vehicles, some MCRVs and MRV(R)s were deployed in support. The number of Warriors deployed in Bosnia remained nearly equal throughout the whole UN deployment of British forces up to November 1995, even with the Warrior fleet being rotated several times. While the REME vehicles were deployed without passive add-on armor, all other vehicles were fitted with the kit to give the crews extra protection from hostile fire. Vehicle modifications included the in-theater addition of a new front tow hitch on the add-on passive armor, the use of winter tracks, as well as the mounting of driver's windscreens with perspex sidescreens to protect the driver against the wind chill.

In order to protect the crews against the freezing winter weather, which often led to the interior of the Warriors being covered by a thick mist of frost in the morning, all soldiers were issued with clothing designed for arctic warfare. Drivers and gunners, who stay in their Warriors most of the time during operations, were also issued black liner suits and mudlock overboots. Like their successors, during their first days in-theater the Cheshires were confronted with militiamen of all warring factions blocking vital roads, signs of ethnic cleansing, refugees begging for life, and all other horrors of a civil war. But soon Britain's



A pair of Warriors checking the situation in Turbe, where Serb, Muslim and Croat positions were facing each other. The patrol was sent out between Christmas and New Year after information reached the Cheshire battle group that a ceasefire had been broken. In this case it turned out that the ceasefire was still intact, but the place later became the site of heavy fighting, especially when Muslim and Croats faced each other after their alliance split and the Serbs tried to gain an advantage out of it.



These Warriors of 2nd Platoon, A Company of the 1st Bn, The Cheshire Regiment are lined up at the main base of the battle group at the Vitez. The last vehicle is the platoon commander's vehicle, which can be identified by its GPS antenna and the call sign "20" painted on the turret. The vehicles are infantry section vehicles with the call signs of "21", "22", and "23". The triangle painted near the call sign on the turret shows that the vehicles belong to A Company.

"White Warriors", which were the most powerful armored vehicles under UNPROFOR command (except for the Danish Leopard 1 MBTs, which arrived in 1994), became a symbol of hope for the local civilians in their search for protection and humanitarian help.

For the first (but not for the last) time, British troops in Bosnia returned fire with the main armament of their vehicles on 10 January 1993. This time it was the Scimitars of the battle group guarding a Danish convoy near Kladanj. Warriors were forced to return fire on later occasions, too. Some of the situations were quite dangerous, such as the time a Warrior shed its track and left the road while under fire from a Serbian position. Just how dangerous a situation can become is shown by an incident that happened on 13 January 1993, when Corporal Wayne Edwards was killed by a sniper as he drove his Warrior through Gornji Vakuf. His vehicle was one of two Warriors of 5th Platoon, B Company of



Christmas Eve 1992. A Warrior section vehicle follows a humanitarian aid convoy into Zenica. The infantrymen who usually travel in the rear compartment of the vehicle are seen here with their weapons ready in the open roof hatch of the troop compartment. During Operation "Grapple", only four dismounts instead of the usual seven were travelling in the vehicle's rear. One reason for this was the lack of numbers of soldiers guarding bases or being deployed somewhere else. Secondly, four soldiers were normally enough to fulfil all the required tasks on convoy duties. Finally, it was simply more comfortable for the troops in the rear, who traveled most of the time behind the armor with hatches down and with most of their equipment crammed in the rear. Note the towing A-bar placed onto the vehicle's rear storage bins. This vehicle belongs to A Company, 1st Bn, The Cheshire Regiment.



Seen in Turbe in March 1993, this Warrior is parked outside the Bosnian Muslim Brigade HQ in the center of the town, which, as the destroyed building behind the Warrior indicates, has been the target of several Serb attacks. Note that only the commander has his hatch open to watch the surroundings, which indicates that the picture was taken during a tense time. The vehicle belongs to the 1st Bn, The Cheshire Regiment battle group.



Warrior infantry section vehicles of the 1st Bn, The Cheshire Regiment travel along one of the better roads in Bosnia. Despite the fact that during the author's visit no vehicle made its way off the road by losing traction on the ice, it was usually a daily routine to recover 30 tons of Warrior from a ditch. In one case, a Warrior of the 1st Bn, The Princess of Wales's Own Regiment of Yorkshire dropped down a cliff and fell on its roof.

the 1st Battalion, The Cheshire Regiment. Corporal Edwards was the first British soldier killed in the Balkan conflict, but not the last.

Between 1992 and 1995, Warriors of the various infantry units deployed within Operation "Grapple" helped the troops to accomplish many things. They found a road to the besieged town of Tuzla to deliver much-needed aid, re-enforced the UN garrison in Sarajevo in order to establish the Heavy Weapons Total Exclusion Zone, deployed on Mount Igman to ensure free passage of aid into Sarajevo, deployed to protect Gorazde, established UN check points all over Bosnia, and escorted countless humanitarian aid convoys to every place aid was needed.

However, in 1995 the situation in Bosnia changed dramatically: A successful spring offensive of Muslim/Croat forces gained ground. The Serbs put Sarajevo under siege again, which brought protests from NATO and UN along with a warning of air strikes. This led to Serbians taking UN soldiers as hostages and blocking all roads into Sarajevo. To counter the brutal Serbian threats to the UNPROFOR mission, a Rapid Reaction Force consisting of British and French Forces was raised. Soon after the 1st Battalion, The Devonshire and Dorset Regiment arrived in Bosnia, they changed the paint scheme of their vehicles from white to black and green camouflage. What followed is well known: Under the pressure of NATO air strikes and artillery of the Rapid Reaction Force, the siege of Sarajevo was lifted and peace talks later led to the Dayton Peace Agreement. In mid-July, Warriors deployed to Mount Igman to protect gun positions. Shortly afterward they forced their way into Sarajevo to open supply roads. Also, Warriors opened fire several times in reaction to countless Serbian bombardments.

British Armored Infantry Battalions with the UN in Bosnia

Operation "Grapple" was the nickname for the deployment of British Forces under the United Nations Protection Force in Bosnia. The first battalion deployed in November 1992 and was relieved after a six-month tour. After the 1995 crises and the intervention of NATO in November 1995, most UNPROFOR troops became part of IFOR and repainted their vehicles white instead of camouflage.

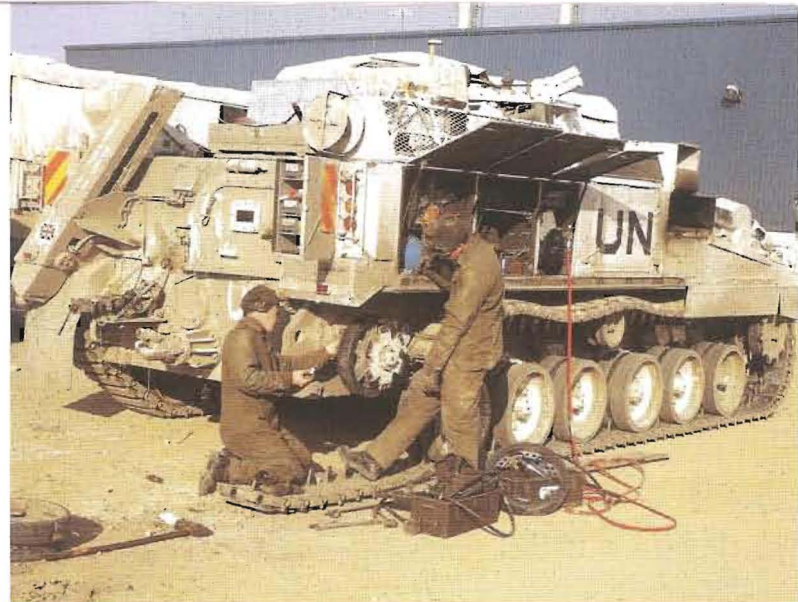
- Operation Grapple 1: The 1st Battalion, The Cheshire Regiment, November 1992 to May 1993
- Operation Grapple 2: The 1st Battalion, The Princess of Wales's Own Regiment of Yorkshire, May 1993 to November 1993
- Operation Grapple 3: The 1st Battalion, The Coldstream Guards, November 1993 to May 1994



The photographer found this Warrior MCRV of the 1st Bn, The Cheshire Regiment battle group in a garage near Vitez. The A-shaped towing cable can be seen mounted on the vehicle's front among other necessary tools for recovery and repair missions. While the section vehicles and infantry command vehicle versions were mounted with passive add-on armor because they often operated under fire, the MCRV and MRV(R) were not fitted with this additional protection.



The complete Warrior power pack consisting of the Perkins CV-8 T V-8 diesel and the X-300-4B fully automatic transmission has been removed from a Warrior MCRV. Clearly visible are the radiator, turbo-charge unit, filters, and air intake. Note the one-man turret of the vehicle to which a 7.62mm L94A1 Chain Gun is mounted. The vehicle, which belongs to the Cheshire battle group, was seen in December 1992.



Rear view of one of the MCRVs of the 1st Bn, The Cheshire Regiment. The group seen outside the garage that was the home of the force's REME elements. The vehicle is awaiting orders to provide REME support during one of countless convoy escort missions. Even with the Warriors proving more reliable than it was thought before the operation, the risk of a breakdown was ever present. Therefore, every convoy escort also contained either an MCRV or an MRV(R). The reliability was also proved when the unit was deployed; the battalion travelled 14 hours through the mountains and only one Warrior broke down with a minor problem that the REMEs soon fixed.

This MCRV shows the signs of operating on the broken down Bosnian roads, which often were no more than muddy trails. But the typical British sense of humor is also visible: In the dirt on the hydraulic stabilizer of the vehicle somebody wrote "Also available in white". In this case, the REME fitters take care of their own vehicle by fitting a new rear idler to the MCRV. Note the open storage bins for tools and the air power-operated screwdriver connected to the vehicle air compressor system via a connection in the storage bin of the vehicle.

- Operation Grapple 4: The 2nd Battalion, The Royal Anglian Regiment, May 1994 to November 1994
- Operation Grapple 5: The 1st Battalion, The Royal Highland Fusiliers, November 1994 to May 1995
- Operation Grapple 6: The 1st Battalion, The Devonshire and Dorset Regiment, May 1995 to November 1995

Anglian Regiment and the 1st Battalion, The Royal Highland Fusiliers, please refer to Concord Publications title 4018, "The Blue Helmets Under Fire."

Shortly after taking over in November 1995, the 2nd Battalion, The Light Infantry transferred from UNPROFOR to IFOR on 20 December. For more pictures of "White Warriors" of the 2nd Battalion, The Royal



This close-up shows the badge painted on the storage bins on the right side of an MCRV belonging to the 1st Bn, The Cheshire Regiment during Operation "Grapple 1". The symbols include the 7th Armoured Brigade's rat, the hammer and spanner of the REME, and the acorn and oak leaf of the Cheshires.

This "Blue Helmet" of the 1st Bn, The Cheshire Regiment wearing issue Scott wind-, dust- and sun-protection goggles is a Warrior commander performing a humanitarian mission in Zenica on Christmas Eve 1992. Note the Cheshire's "22" Regiment pennant on the Warrior's radio aerial behind him.



This photo of the right turret side of Warrior "22" illustrates the "armed wasp" insignia that was painted on all Warriors of B Company, 1st Bn, The Cheshire Regiment during their UNPROFOR deployment of 92/93. Call sign "22" marks the second section of the 2nd Platoon of B Company.



Already repainted in black and green, Warrior section vehicles of the 1st Bn, The Devonshire and Dorset Regiment deploy on Mount Igman. Interestingly, it could be said that along with the change of color, the role of the Warrior has also changed from a big white target for all sides of the Bosnian conflict to a feared enemy. Even though the British Warriors were respected before because they had returned fire when necessary during their white paint days, they are taken more seriously now in camouflage paint. (Yves Debay)



The last unit that deployed their Warriors painted in UN white to Bosnia was the 1st Bn, The Devonshire and Dorset Regiment, which arrived in Bosnia in May 1995. Shortly after its arrival in early June, the battalion reformed to form Task Force Alpha of the Rapid Reaction Force under the UN command in Bosnia. The most obvious feature of the new assignment was that the vehicles were repainted in black and green camouflage. This platoon command vehicle belongs to elements of Task Force Alpha, which on 3 July deployed to Mount Igman in order to protect gun positions of 19th Regiment, RA. The flag flies from the antenna, though the commander and gunner are wearing DPM covers on their helmets instead of UN blue covers. (Yves Debay)



This Warrior section vehicle of B Company, 1st Bn, The Devonshire and Dorset Regiment was seen in July on Mount Igman near the ski jump arena that was part of the sports facilities during the 1984 Olympic games. The vehicle covers French engineers who are constructing shelters for the troops of the Rapid Reaction Force deployed there. Note the Supercat of 24 Airmobile Brigade in the background. Clearly visible on the Warrior is the turret roof-mounted wire cutter, the two-piece hatch over the troop compartment, as well as the UN number plate still painted in the original white paint that was repainted earlier. (Yves Debay)



Deployed on Mount Igman, this Warrior section vehicle is protecting the position of a FOO of 19th Regiment, Royal Artillery. Note the FOO still wears its blue helmet cover. In late August, NATO air strikes and artillery bombardments were carried out against Serb positions around Sarajevo. In some cases the 30mm Rarden guns of the Warriors of the 1st Bn, The Devonshire and Dorset Regiment were used to engage suitable targets that could not be engaged by artillery or air strikes. (Yves Debay)



Warrior section vehicles of B Company, 1st Bn, The Devonshire and Dorset Regiment make their way to the top of Mount Igman in July 1995. The tracks of the vehicles are nearly worn out and need to be changed soon. The Warriors drove over 359,000 km (223,000 miles) during the six-month tour, changed over one hundred track sections and replaced approximately 750 track pads. Note the turret-mounted wire cutter, as well as concertina wire stored in the front of the vehicle. (Yves Debay)

IFOR and SFOR — Peace by Force



When the 2nd Bn, The Light Infantry deployed to Bosnia in November 1995, they took over from the 1st Battalion, The Devonshire and Dorset Regiment, which had their Warriors' paint schemes repainted from UN white to green and black when they became part of the Rapid Reaction Force. Here one of these Warrior FV510 Infantry Section Vehicles can be seen outside a building at the Banja Luka metal factory in March 1996. The vehicle, which belongs to A Company, is fitted with the passive add-on armor. White UN paint is visible beneath the camouflage colors. Note the 2 LI badge above the gun, the IFOR lettering painted on the vehicle's side and the wire cutter mounted on the turret. These wire cutters were added to protect crews driving with open hatches from having their heads chopped off by low hanging cables like power lines or telephone lines, a common problem in war-shaken Bosnia.

After the Dayton peace agreement was signed on the 14 December 1995, on 20 December the authority in Bosnia was officially transferred from UNPROFOR to the NATO-led IFOR, which had a much more broadly defined mission. The mission, which stayed the same for SFOR later, was to monitor and, if necessary, enforce compliance with the military aspects of the Dayton agreement. On the military side, IFOR included the following tasks:

- To establish self-defense and freedom of movement.
- To supervise the marking of the Zone of Separation (ZOS) and boundaries between the parties of the conflict.
- To monitor and enforce the withdrawal of forces to their territories and the establishment of the ZOS.
- To assume control over airspace over Bosnia-Herzegovina and the military traffic on ground routes.
- To establish joint military commissions.

The deployment of IFOR was also intended to create the secure environment necessary for the work of humanitarian agencies and the accomplishment of the non-military aspects of the agreement within the capabilities and the limits imposed by carrying out its military task. When the British Warriors that formed part of the Rapid Reaction Force were already painted green and black, most units now exchanged UN white helmets for camouflage and national head dress. Commanded by the ARRC, IFOR was organized into three divisions: the US-led Multinational Division North (MND-N), the French-led Multinational Division South East (MND-SE) and the British-led Multinational Division South West (MND-SW). In 1995 and early 1996, MND-SW was led by 3rd UK Armoured Division and consisted of 4th (UK) Armoured Brigade, which



A soldier of the 2nd Bn, The Light Infantry stands guard in front of a platoon base situated in a burned down restaurant along the Mrkonjic Grad-Banja Luka road. With the transfer from UN to IFOR, troops readopted the national Union Jack and stopped flying the UN flag, the latter having become a symbol of failure in Bosnia. Note the badge of 4th (UK) Armoured Brigade, a desert rat in a different appearance to that of the 7th Armoured Brigade, painted on the Raven sight shutter on the turret.



Warriors of the 2nd Bn, The Light Infantry patrol the main road leading from Mrkonjic Grad to Banja Luka. During the war this road was a "no go" area for UNPROFOR; the peacekeepers were denied access to the Serbian populated and controlled area. Once IFOR took control, British Forces opened the road by using their Warriors to display their strength. Later, a couple of company bases were situated at the strategically important supply road and manned by soldiers of the Light Infantry. The driver's detachable windscreen is used on both vehicles to protect the driver from the freezing temperatures in central Bosnia.

Fielded the 2nd Bn, The Light Infantry as an armored infantry battalion. The 2nd Bn, The Light Infantry had just taken over from the 1st Bn, The Devonshire and Dorset Regiment, which was the last British armored infantry battalion under UNPROFOR. The next months saw all IFOR troops, including the 2nd Bn, The Light Infantry with their Warriors, busy establishing freedom of movement, marking the ZOS and mine fields, and escorting and distributing aid to local population. They also monitored the withdrawal of foreign troops from Bosnia and the movement of forces into their barracks, organized a peaceful hand over of conquered parts of Central Bosnia from Muslim and Croat forces to Serbs, and supported and protected the return of thousands of refugees to their homes.

During all this the Warriors were used to deter aggressive hard-liners from taking action against the British soldiers. Warriors were seen parked outside British bases in order to provide protection. They also escorted convoys or re-enforced roadblocks where IFOR and later SFOR searched for war criminals, as well as controlled the movements of ethnic groups. In some cases, Warriors with their 30mm Rarden gun were moved into action to bolster the arguments of British officers when dealing with unwilling hard-liners in the local commands of the former opposing armies. In December 1996, the IFOR mandate was extended, and from that time the NATO-led forces were called "Stabilization Force", or SFOR, which was also the letters painted on the sides of the vehicles. Basically, this was only a change of name; the mission of the troops on the ground remained the same.

Despite a number of setbacks over the years, the situation in Bosnia changed. The Warriors were no longer needed



In order to cope with the icy roads of the Bosnian winters, the Warriors of the deployed armored infantry units were fitted with a special winter track. Note the cleats of the track clearly visible between the rubber pads on this Warrior FV510 Infantry Section Vehicle of the 2nd Bn, The Light Infantry.



In addition to the Warriors of the infantry, Warrior FV514 MAOVs and Warrior FV515 BCVs of the artillery units were fitted with the add-on armor before they deployed to Bosnia. The picture shows two Warrior FV514 MAOVs of 26th Regiment, Royal Artillery during the first live firing of IFOR troops on the newly established Glamoce ranges on 28 February 1996. Note that the rear-mounted MSTAR masts are missing on both vehicles. According to an Alvis source, these were removed because they were of no use in the mountainous terrain.



The REME elements of the 2nd Bn, The Light Infantry deployed Warrior FV512 MCRVs to recover broken down vehicles. In most cases the vehicles were used to recover vehicles which had veered off the road and got stuck due to the icy road and high-speed traffic. This Warrior FV512 MCRV is on its way to another recovery after it has just left C Company's base at Krupa. Note the driver's windscreen and 4th (UK) Armoured Brigade painted on the shutter of the turret-mounted sight.

The rear view of the same Warrior FV512 MCRV from the 2nd Bn, The Light Infantry gives us a good impression of the split rear door, the upper part of which is open here. The rear view of the vehicle clearly shows the hydraulic stabilizer in travelling position in the top corner.



A detail shot of one segment of the appliqué Chobham armor, a side plate developed and built by Vickers Defence Systems and GKN Defence and fitted to all Warrior fighting vehicles on operations. The plate is fitted to a Warrior FV510 Infantry Section Vehicle of A Company, 1st Bn, The Worcestershire and Sherwood Foresters Regiment, which was seen in Bosnia in autumn 1996. All Warriors of the unit were marked with the battle honors of the Regiment, as well as the regimental badge. This vehicle is named after ALBUHERA, while others were named ARMENTIERES 1914, AUBERS and ALMA.



This three-quarter view of a Warrior FV511 Infantry Command Vehicle of A Company, 1st Bn, The Worcestershire and Sherwood Foresters Regiment allows a good look at the vehicle's appliqué Chobham armor. First fitted to Warriors of the British Army during the Gulf War, the passive add-on armor has become standard issue on all vehicles deployed on operations. The add-on armor kit consists of side panels and a front armor slab to protect the driver.

to encourage peaceful thoughts in the minds of the locals. While the Warriors remained in the compounds, the troops patrolled on foot or in soft-skinned vehicles. This gave the locals the impression that normal life had returned to Bosnia and helped build their confidence in the peace. As a result of the calm situation during recent years, the presence of SFOR troops in Bosnia has been constantly reduced. The last large-scale reduction of SFOR forces in Bosnia was made in the summer of 2000, leaving SFOR with 20,000 troops, 10% of which are British, including one battle group equipped with Warriors. But the number of Warriors based in Bosnia is well under battalion strength since the battle group also fields a squadron of Challenger 2s and other assets.

Armored Infantry Battalions Deployed with Warriors under IFOR and SFOR

With the change from UNPROFOR to IFOR, the code name for the operation of British forces in Bosnia changed from Operation "Grapple" to Operation "Resolute"

Resolute 1	2nd Bn, The Light Infantry (November 1995 to May 1996)
Resolute 2	1st Bn, The Worcestershire and Sherwood Foresters Regiment (May 1996 to November 1996)
Resolute 3	1st Bn, The Green Howards (November 1996 to May 1997)



A Warrior FV510 Infantry Section Vehicle of A Company, 1st Bn, The Worcestershire and Sherwood Foresters Regiment patrols in August 1996 near Sipovo in Bosnia. The vehicle is passing a Serbian church that was probably burned by Muslim or Croat forces. While patrolling with armored vehicles was part of NATO's deterrence policy in the IFOR period and the early SFOR service, these patrols were later abandoned in favor of foot patrols and mounted patrols in Land Rovers in order to give the local population a feeling of an ongoing de-escalation.



These Warrior FV510 Infantry Section Vehicles belonging to A Company, 1st Bn, The Worcestershire and Sherwood Foresters Regiment were seen parked at the base of the unit in Mrkonjic Grad in August 1996. They afford a good view on the glaucis plate of the engine deck and show the lack of the add-on armor around the engine compartment. Add-on armor plates do not protect the engine compartment because they might compromise the cooling of the engine pack.

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|-------------|--|
| Resolute 4 | 2nd Bn, The Royal Regiment of Fusiliers (May 1997 to November 1997) |
| Resolute 5 | 1st Bn, The King's Own Royal Border Regiment (November 1997 to May 1998) |
| Resolute 6 | 2nd Bn, The Royal Green Jackets (May 1998 to November 1998) |
| Resolute 7 | 1st Bn, The Worcestershire and Sherwood Foresters Regiment (November 1998 to May 1999) |
| Resolute 8 | 1st Bn, The Royal Highland Fusiliers (May 1999 to November 1999) |
| Resolute 9 | 1st Bn, The Royal Regiment of Wales (November 1999 to May 2000) |
| Resolute 10 | 1st Bn, The King's Own Royal Border Regiment (May 2000 to November 2000) |

Except for their camouflage paint scheme, the Warriors deployed with IFOR and SFOR were identical in appearance to those of the UN-deployed armored infantry units of the British Army. Warrior FV510 Infantry Section Vehicles, Warrior FV511 Infantry Command Vehicles, Warrior FV514 MAOVs, and Warrior FV515 BCVs were fitted with the add-on armor. In addition, Warrior FV512 MCRVs and Warrior MRV(R)s were deployed with various REME elements of the armored regiments deployed with their Challenger 1 and later Challenger 2 main battle tanks.



"Armies" is the name of this Warrior FV510 Infantry Section Vehicle and a battle honor of the 1st Bn, The Worcestershire and Sherwood Foresters Regiment. Belonging to A Company of that regiment, it was seen in August 1996 on patrol in the totally destroyed village of Jezero, which is situated in the "Anvil" area where fighting nearly never ceased during the whole war in Bosnia. Note the engine oil drums in the POL hopper, which is part of the add-on armor package, and the new hocking point that has been bolted onto the add-on armor since early use of the Warrior during the UNPROFOR era.



This Warrior FV513 MRV(R) belonging to the REME LAD detachment of the company was also seen at the base of A Company, 1st Bn, The Worcestershire and Sherwood Foresters Regiment in Mrkonjic Grad. Like the other Warrior variants, the vehicle bears the name of one of the regimental battle honors, in this case it is "EGYPT 1882."



During their deployment under MND SW between November 1998 and May 1999, the 1st Bn, The Worcestershire and Sherwood Foresters Regiment formed part of 1st Mechanized Brigade, which then deployed the HQ element of the British-led brigade in the division. The picture of the Warrior commander allows us to clearly see the regimental shoulder title and the brigade badge worn on his left sleeve with a Union Jack badge.



Also seen on the Manjaca ranges in April 1997 was this Warrior FV513 MRV(R) of the REME LAD of C Company, 1st Bn, The Green Howards. Note the massive earth anchor mounted to the rear of the vehicle and the visible recovery equipment belonging to the vehicle-fitted 20-ton winch.



This Warrior FV510 Infantry Section Vehicle of C Company, 1st Bn, The Green Howards is pictured during live-firing exercises held at the Manjaca Ranges in Bosnia in April 1997. The 30mm L21A1 Rarden cannon can fire APDS-T, APSE-T, HEI-T and TP-T rounds up to a range of 4000 meters (4372 yards), but the effective range of the weapon lays between 400 and 1500 meters (437 and 1640 yards). The weapon has a theoretical cyclic rate of fire of 80 to 90 rounds, which cannot be achieved in reality since the weapon is manually loaded with three-round clips by the crew. A 7.62mm chain gun is mounted to the left of the gun as a coaxial weapon.

Assembled at the open roof hatch of the rear compartment of a Warrior, soldiers of C Company, 1st Bn, The Green Howards watch a platoon attack conducted by their comrades on the Manjaca ranges. The huge split hatch is opened to both sides and locked in position to prevent bouncing during cross-country movement of the Warrior FV510 Infantry Section Vehicle.



Soldiers of C Company, 1st Bn, The Green Howards return to their Warrior FV510 Infantry Section Vehicle after clearing enemy positions during an exercise at the Manjaca ranges south of Banja Luka in April 1997. The commander has opened the rear door of the vehicle using his control panel located in the turret.



A Bedford tanker refuels a Warrior FV510 Infantry Section Vehicle of C Company, 1st Bn, The Green Howards at the Manjaca ranges in Bosnia in April 1997. The two rigged plastic fuel tanks of the Warrior, which are strapped centrally on the hull floor of the vehicle under the turret, can contain up to 741liters (196 gallons) of diesel fuel. The fuel is delivered to the engine by an electrical supply pump. The filling point of the vehicle is located at the front right of the turret from where a filler pipe leads down to the tanks.



A Warrior FV512 MCRV of the Royal Scots Dragoon Guards sits at the base of A squadron in Bosnia while maintenance work is carried out on one of the unit's Challenger 1 main battle tanks. In its REME LAD, each squadron of the British Army's armored regiments is equipped with a Warrior FV512 MCRV in addition to a Challenger ARV. Note the Scottish badge and the SFOR markings on the side of the Warrior

KFOR-Warriors in Kosovo

In December 1998 British Army units, including elements of the 1st Bn, King's Own Royal Border Regiment and their Warriors, deployed to Macedonia as part of the multinational Extraction Force in order to be ready to evacuate members of the Kosovo Verification Mission. This was only the beginning of what later became known as the Kosovo War. In fact, the hostilities in the region started much earlier and were kindled by Milosevic in 1989 with the step-by-step removal of Kosovo's autonomy and the imposing of direct rule from Belgrade. By 1992 the Kosovo Albanian policy of non-violent resistance had failed, culminating in the formation of the Kosovo Liberation Army, which resorted to violent means to try to achieve its objectives. KLA attacks on Yugoslav/Serbian security forces brought ever more heavy-handed responses, often involving civilians, which led to open conflict breaking out in January 1998.



The first British troops deployed to Macedonia in December 1998 as part of the NATO Extraction Force. Among these were the reenforced "Burma" Company of the 1st Bn, King's Own Royal Border Regiment, including elements of the 1st Bn, The Royal Irish Regiment and the 1st Bn, The Highlanders. This picture shows one of a total of 14 deployed Warriors being refueled on a Macedonian range near Skopje in January 1999. (Yves Debay)



In addition to Warrior FV510 Infantry Section Vehicles, the British Extraction Force element of the 1st Bn, King's Own Royal Border Regiment fielded Warrior FV511 Infantry Command Vehicles. Two of them can be seen in this photograph, which was taken in Macedonia during an exercise in January 1999. Other Warriors included one FV513 MRV(R) and one FV512 MCRV. All 14 Warrior infantry section and command vehicles were fitted with the bolt-on additional armor. According to comments from the crews, the winter in Macedonia was a challenge for the Warriors because in some cases temperatures dropped so low that batteries froze and fuel lines split. The only solution was to let the engines run around the clock. (Yves Debay)

The ethnic violence in Kosovo was soon detected by the international community, who put pressure on Yugoslavia through some UN resolutions and on 25 October the OSCE set up the Kosovo Verification Mission. But the presence of monitors in Kosovo failed in its aim, and the hostilities between Serb security forces and the KLA went on. On 23 February the Rambouillet peace talks failed. In addition, Milosevic and the Serb security forces violated agreements of the withdrawal of troops. This together with arrival of approximately 400,000 refugees in the states of Albania and Macedonia, led to the beginning of NATO air strikes on 24 March. On 9 June, after three months of air strikes, Yugoslav military authorities signed "The Military Technical Agreement", which mainly focused on the withdrawal of the Yugoslav security forces from Kosovo. On the 10th, NATO suspended its air strikes.

Returning to the Warrior units, the deployed elements of 1st Bn, King's Own Royal Border Regiment, belonging to the multinational Extraction Force, became operational on 15 January after countless training sessions in Macedonia involving everything from personal skills at-arms training to company-level live-firing exercises. After the decision of the British government on 4 February to commit up to 8000 troops to a peace implementation force in Kosovo, 4th Armoured Brigade was announced as the Lead Armored Battle Group. Shortly afterward, 1st Bn, Irish Guards, reenforced by A (King Harald) Company, 1st Bn, The Green Howards and A Company, 1st Bn, The Royal Highland Fusiliers, began its deployment. First the Warriors of the unit were transported by rail to Emden, and from there they were shipped to Thessaloniki in Greece. Then they were brought forward to Macedonia, where the elements of 4th Armoured Brigade joined with the elements of the Extraction Force.

By mid-March, 4800 British troops were already deployed to Macedonia under Operation "Agricola", which involved soldiers of the King's Royal Hussars with Challenger 1s, 88 Arracan Battery, 4 Regiment Royal Artillery, with its AS 90 self-propelled guns, and elements of 2nd Battalion REME. Warrior variants such as the FV512 MCRV, the FV513 MRV(R), the FV514 MAOV, and the FV515 BCV were deployed with all units mentioned. By end of April, the presence of British troops reached 6300. This number was further enlarged with the deployment of the 1st Bn.



In June 1999, shortly after KFOR deployed into Kosovo, this Warrior from the 1st Bn, Irish Guards was spotted on patrol in Kosovo Polje, one of the trouble spots in the AOR of the British-led MNB(C). Some 40 Warrior infantry section and command vehicles were deployed with the 1st Bn, Irish Guards and the units re-enforcing A (King Harald) Company, 1st Bn, The Green Howards and A Company, 1st Bn, The Royal Highland Fusiliers. Note the commander's and gunner's webbing placed on the vehicle's smoke-laying equipment. This was a common practice among the British troops born of the need to compensate for the cramped conditions inside tactical vehicles. Also stored on the engine deck among various other tools are two folding chairs of the type usually used in command posts.

Royal Irish Regiment, which was equipped with Saxon wheeled APCs, as an additional infantry battalion, and 5 Airborne Brigade with two infantry battle groups in May and early June. This brought the total number of British troops within KFOR to 13,000 troops.

Led by light airmobile forces of 5 Airborne Brigade, British troops crossed the border to Kosovo on the night of 12 June 1998. The first Warriors, belonging to 4th Armoured Brigade, reached Pristina by mid-day on 13 June. The KFOR troops followed the retreating Serbian forces closely in order to prevent the KLA from gaining power in unruly areas and also to provide as much protection to the civilian population as possible. On 16 June the King's Royal Hussars battle group moved from Pristina to Podujevo, which they reached on 18 June.

The battle group comprised 28 Warriors of the 1st Company, 1st Bn, Irish Guards and A Company, 1st Bn, The Royal Highland Fusiliers in addition to the KRH Challenger 1s. Just as before at the Kacanik pass, the British KFOR troops were greeted by crowds of cheering people in Pristina and several other towns, welcoming them as liberators. In some cases, Warriors were seen covered thickly with flowers thrown by the happy Albanians. Once the British Army units had reached their AOR, including Pristina, the capital of Kosovo, and Podujevo east of Kosovo, troops immediately started to patrol the streets to prevent further ethnic cleansing, which by this time was being carried out by Albanians who wanted to take revenge on the Serbs. Also, fulfillment of the Military Technical Agreement had to be ensured.

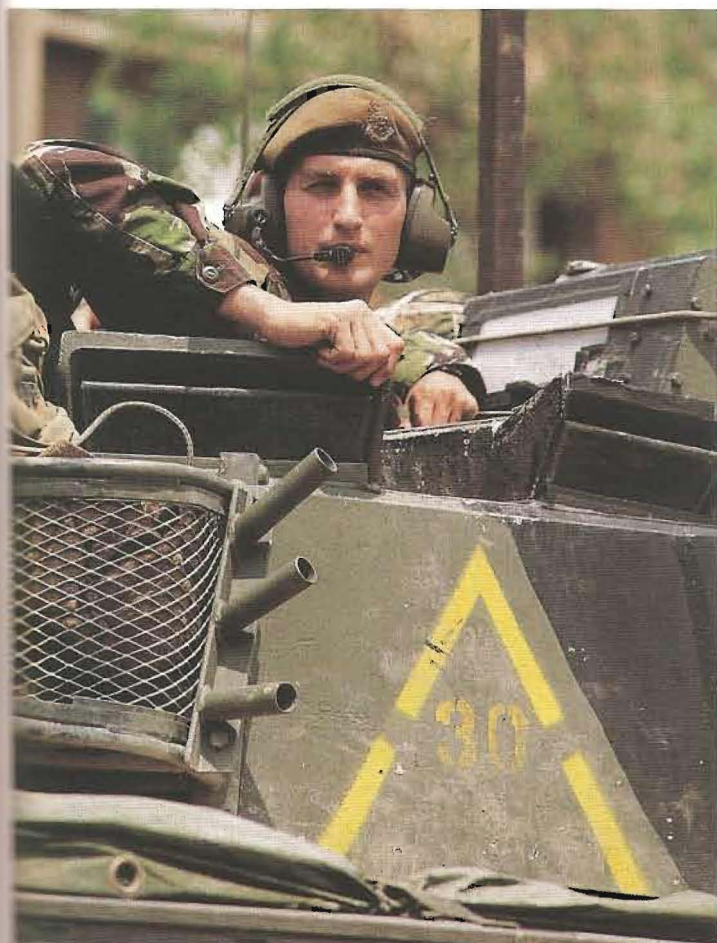
In this early era of KFOR, Warrior infantry fighting vehicles became a common sight in the AOR of the armored infantry units. Mounted on their Warriors, soldiers of the Irish Guards, Green Howards, The Highlanders, and The Highland Fusiliers were seen patrolling the cities and the rural areas. Meanwhile, their comrades with their Warriors manned roadblocks and provided security to threatened places like Serb churches or important infrastructures like power stations and factory complexes. Often infantrymen deployed with their Warriors to prevent a violent mob from breaking loose. The first armored infantry units deployed with all their Warriors. But the successful deescalation in Kosovo, along with the reduced threat of an attack by the Serbian army, led to the practice of deploying Warrior units with only enough Warriors for two of their companies and with only one company operating the vehicles daily. The other elements were equipped with wheeled vehicles like the armored Land Rover Snatch. The first unit deployed with this structure was the 2nd Bn, Royal Green Jackets. One reason for this was that Warriors caused too much damage to the already fragile Kosovo roads.



All Warriors of A (King Harald) Company, 1st Bn, The Green Howards that served in Kosovo had the names of Victoria Cross bearers from the regiment painted on the left and right side of the vehicle's add-on armor. The regiment received 18 Victoria Crosses during its three-hundred-year history. The picture shows a Warrior section vehicle named after Sergeant William McNally MM, who won his VC on 27 October 1918 for his action in the battle at the Piave River in northern Italy. Other names witnessed by the author on other Warriors of the Green Howards were Seagrim VC, Hirsch VC, Anderson VC, Bell VC and White VC. Note the NATO sticker, which is seen on all KFOR vehicles, and the inverted "V" symbol.



Platoon commander's Warrior of A (King Harald) Company, 1st Bn, The Green Howards seen in Kosovo Polje in early July 1999. Note that the jumper cable and recovery equipment are ready to use. This was a common practice to minimize recovery time in case of an emergency, especially for a vehicle breakdown under fire. As in previous operations such as the Gulf War or the deployment under UN, IFOR and SFOR, all Warrior FV510, FV511, FV514 and FV515 versions deployed to Kosovo were fitted with the add-on armor, which can be seen on the pictured vehicle.



Here the platoon commander of Third Platoon, A (King Harald) Company, 1st Bn, The Green Howards watches a suspect group of Albanians in Kosovo Polje in early July 1999. Note the turret details, including the tubes in which poles are fixed when using camouflage netting and the plastic sheets attached with tape to the cover of the Raven sight. During operations, tactical information such as grid references, strength of enemy, and other information that has been gathered can be noted on the sheets with a water-resistant marker. The attached bungee acts as a map holder so the vehicle commander can have one hand free to use binoculars or operate the radio.



These soldiers of the 1st Bn, The Royal Regiment of Wales were photographed in March 2000 while manning a VCP on KFOR's main supply route "Hawk", which links Pristina with Skopje in Macedonia. During the deployment of the 2nd Bn, The Royal Green Jackets, the unit was supported by soldiers of 15 TA Regiments, who did not serve on the Warriors, and by a platoon of the 1st Bn, The Royal Regiment of Wales, which became part of A Company. The Warrior's power-operated door can be seen in detail. To its left, the outside operating panel can be seen above the vehicle's number plate.



During the deployment of A Company, 1st Bn, The Royal Highland Fusiliers, the unit formed part of the 1st Bn, Irish Guards, but it was cross-attached to the King's Royal Hussars battle group based in Podujevo. Here a Warrior infantry section vehicle of the Fusiliers can be seen during a patrol launched into the rural area to the north of Podujevo close to the boundary separating Kosovo from Serbia.

In order to get the people back to normality in the civil-war-shaken country, KFOR nowadays shows force with troops patrolling streets rather than with heavy armor moving around like in the early days. However, just as in previous deployments to the Gulf and Bosnia, the GKN-designed Warrior once again proved its reliability, effectiveness and combat power.

British Armored Infantry Units under KFOR

Between 1998, when the deployment of British troops to Macedonia as part of the Extraction Force began, and autumn 2000, when this book was written, the following British Army infantry units equipped with Warriors were deployed to Kosovo as part of KFOR:

- 1st Bn, King's Own Royal Border Regiment (with elements of 1st Bn, The Royal Irish Regiment and the 1st Bn, The Highlanders) from December 1998 to June 1999
- 1st Bn, Irish Guards (reenforced by A (King Harald) Company, 1st Bn, The Green Howards and A Company, 1st Bn, The Royal Highland Fusiliers) from March to September 1999
- 2nd Bn, The Royal Green Jackets (reenforced by a platoon of the Royal Regiment of Wales) from October 1999 to March 2000



Belonging to the King's Royal Hussars, this Warrior MCRV was photographed at the main base of the regiment in Podujevo in July 1999. Together with two FV432s and a Challenger ARV, the Warrior MCRV formed the REME Light Aid Detachments of the tank squadrons, which at the time fielded 14 Challenger 1 main battle tanks. The recovery kit, which includes an A-frame recovery bar and different types of towing ropes, is ready for action on the front of the vehicle.



All infantry units, armored regiments and REME units deployed Warrior MCRVs and Warrior MRV(R)s to Kosovo. This Warrior MRV(R) called "Athleague" of the King's Royal Hussars has just extracted the turret of a Warrior section vehicle believed to belong to A (King Harald) Company, 1st Bn, The Green Howards. The turret can be seen hanging from the 360° traverseable crane of the MRV(R), which has a capacity of 6.5 tons. The engine deck has been removed from the Warrior section vehicle chassis and the cooling system is visible.

- 2nd Bn, The Royal Regiment of Fusiliers from March to September 2000
- 1st Bn, The Princess of Wales's Royal Regiment from September 2000 onward

In addition, Warrior variants like the MCRV, MRV(R), MAOV and BCP served with the deployed armored and artillery regiments, as well as with REME units. For additional reading on KFOR, I would refer the reader to Concord Publications' Special Ops 7, the special Kosovo issue.



Photographed at the King's Royal Hussars battle group HQ in Podujevo, crew members of the attached 88 Arracan Battery, 4 Regiment, Royal Artillery carry out maintenance work on their Warrior FV515 BCV. Like the Warriors of the infantry, the vehicle is fitted with the add-on armor. Note that the turret basket is removed, which allows a clear view of the two antenna sockets at the rear of the turret. Note the huge white inverted "V" painted on the side of the vehicle. This was used as an identification mark by all allied vehicles deployed under KFOR.



This picture of a Warrior FV510 Infantry Section Vehicle of the 1st Bn, The Royal Highland Fusiliers shows the business end of the 30mm Rarden gun as the vehicle moves down a road in the Podujevo region in July 1999.



Based in Celle in Germany, the 2nd Bn, The Royal Regiment of Fusiliers currently forms part of the 7th Armoured Brigade "The Desert Rats". The unit's insignia, the red jerboa rat, is painted on the side of this Warrior infantry section vehicle belonging to A Company seen near Stimlje in July 2000. Due to operational requirements, 2 RRF deployed only two infantry companies of the battalion with their Warriors, while the rest operated with the Land Rover Snatch. In addition, the Warriors of the BN HQ, the Milan section and the unit's REME elements were deployed.

Warrior 2000 and Further Development of the Warrior Vehicle Family

At the time of this writing, Warrior 2000 is the latest evolution in the process of continuous improvement of the Warrior vehicle family. The vehicle, which is a private venture of Alvis, was developed to meet the requirements of the Swiss Army for a new infantry fighting vehicle. Three vehicles were built and trials were conducted in Switzerland between mid-1998 and mid-1999. In the end, the Hägglunds CV 9030 was chosen by the Swiss Department of Defence, Civil Protection and Sport. It was stated that Warrior 2000 and CV 9030 performed equally well, while the third contender, the KUKA/Henschel Wehrtechnik M-12, lacked speed and mobility. Due to the lower price of the CV 9030, including the purchase price and the lifelong support costs, Warrior 2000 placed second. But this step back was not the end of the Alvis Warrior 2000; the vehicle is already shortlisted for the trials of the Finnish Army for their further armored

infantry fighting vehicle requirements.

Based on Warrior, the Warrior 2000 was developed and built in nine months by Alvis, incorporating experience gained by the British and Kuwaiti Army with the Warrior vehicle family. GKN Defence (now Alvis) has also designed a Warrior Reconnaissance Vehicle that is based on Desert Warrior and stuffed with sophisticated electronics such as multi-spectral surveillance systems, thermal-imaging kit, a laser range finder, GPS, and a battlefield surveillance radar. A telescopic mast is fitted to the rear of the vehicle on which a sensor pack is mounted that includes a laser range finder, M-STAR, and daylight and thermal observation devices. The Warrior Reconnaissance Vehicle was designed and manufactured as a technical demonstrator and will not be marketed by Alvis as part of the Warrior family portfolio.

Prior to the Warrior 2000 and the Warrior Reconnaissance Vehicle GKN Defence, and later Alvis, produced various Warrior-based prototypes to meet the armored vehicle requirements of the British Army and foreign nations. One of these was the Arctic Warrior, basically a Desert Warrior with the omission of the two TOW ATGW launchers on the Delco turret and with a diesel air-to-air heater replacing the air-conditioning system to battle the freezing arctic temperatures. GKN Defence's Arctic Warrior competed with the Hägglunds CV 9030, with the latter being selected by the Norwegian Army as their new armored infantry fighting vehicle. Ironically, today both companies, GKN Defence and Hägglunds Vehicle AB, form part of Alvis PLC.



The hull of Warrior 2000, which is made of welded aluminum armor, is 230mm (9 inches) longer than that of the classical Warrior. Incorporated spaced armor provides protection against 30mm APFSDS projectiles, and a higher level of protection can be reached by mounting on add-on armor similar to that used by the British Warriors during operations. The Warrior 2000 hull incorporates stealth technology wherever possible. The basic layout of Warrior 2000 is similar to the previous Warrior vehicles with the driver to the front left, power pack to the front right, the turret in the vehicle's center, and the troop compartment in the rear of the vehicle. Improvements included the upgrading of the Perkins power pack, the addition of a twin-fan cooling group, and an air-cooled silencer for the rear right exhaust. This reduces the thermal and acoustic signature of the vehicle. For faster maintenance, the engine decks at the front of the vehicle are lifted by an integral hydraulic ram. In addition, the mobility of the vehicle is enhanced by a new double-pin track that has a higher durability and is easier to maintain. The track incorporates quick-release track pads that allow the installation of ice grouser in exchange for rubber pads.

Mounted in the center of Warrior 2000 is a two-man Delco Defense Systems Operations all-electric turret, which is basically the LAV-25 turret with a larger turret ring and a new weapon system. The main armament of the turret is the Bushmaster II cannon, which can fire either single rounds or bursts with a rate of 200 or 400 rounds a minute. Coaxial to it a machine gun is mounted on the left, and on either side of the turret a bank of four smoke grenade launchers is mounted. Situated inside the turret are a digital fire control system; the gun stabilization system; the twin gunner control handles; the commander's single control handle; a Raytheon stabilized day/thermal sighting system with laser range finder and one periscope; the commander's eight periscopes for all-around observation; a flat screen display that receives its picture from a camera mounted over the cannon; and a monitor for the commander showing the view of the gunner's sight. The commander sits to the right, while the gunner is situated to the left. Both have their own single-piece hatch that opens to the rear. (Alvis PLC)



The infantry section in the rear sits on either side of the hull facing inward with four soldiers on the right hand side and the remaining three on the left. They can enter and leave the vehicle via a power-operated ramp in which an emergency door is also situated. For the benefit of the section commander, located in the roof is a single-piece hatch over the right side of the troop compartment, as well as seven periscopes. Warrior 2000 features a video distribution system that provides images directly to the infantry of either the driver's thermal viewer, the turret mantlet camera, the thermal sights in the turret, or the reversing camera via a monitor mounted in the troop compartment. Other standard equipment includes an air-conditioning/NBC system, fire detection and suppression system and a rear-mounted camera and monitor in the driver's compartment to aid the driver. (Alvis PLC)

Other prototypes include the Warrior LMT 105mm light tank fitted with a South African-made 105mm tank gun; an Anti-Tank Warrior fitted with a HOT ATGW turret; an Engineer Warrior to suit the needs of the Royal Engineers; the Warrior MLRS mounted with the artillery rocket system on its hull; the Warrior Mortar Carrier equipped with 81mm and 120mm mortars; the Warrior Anti-Aircraft Vehicle fitted with either a 30mm cannon or the Shorts Starstreak High-Velocity Surface-to-Air

Missile System; the Warrior Ambulance; the Warrior Logistic Vehicle; and the Warrior APC 90 version of the Warrior. The Warrior APC 90 is shortened by one road wheel and fitted only with a 7.62mm machine gun cupola. For trials with the Belgian Army, Warrior prototypes fitted with 25mm Oerlikon cannon and a Cockerill 90mm gun were produced. Both weapons were mounted in two-man turrets made by Cockerill in Belgium.

To meet the British Army requirements for a Multi-Role Armored Vehicle (MRAV), Alvis designed the Warrior Utility Vehicle. The produced prototype, which is basically the hull of the infantry section vehicle redesigned for command post use, is fitted with the same turret as the MCRV and MRV(R). It must be stated that this list is far from complete. Since the designers started to work on the MCV-80, as the Warrior was called nearly 30 years ago, countless design studies meeting nearly every type of requirement were made. However, most did not leave the drawing board or pass the model state and thus were never constructed as prototypes.



Using a Fully Integrated Battle Management System, information can be passed on in real time from the Warrior Reconnaissance Vehicle to the force commanders. Like the Desert Warrior, the Delco LAV-25 turret is fitted to the hull of the Warrior Reconnaissance Vehicle. With TOW, eight smoke grenade dischargers and a stabilized 25mm M242 cannon, as well as a 7.62mm M240 coaxial machine gun, the vehicle is well equipped to fight on the battlefield. The original Desert Warrior chassis is shortened by one road wheel. The vehicle is fitted with an advanced armor package that brings the length of the vehicle back to the 6.43m (21feet) length of the Warrior section vehicle of the British Army when fitted with the appliqué armor. Note the similarities of the track, engine deck, and the front of the hull, which reflect the origin of the vehicle, the design being based on the Desert Warrior. Also of interest are the long armored side skirts that protect the running gear of the vehicle nearly down to the ground against the effect of anti-tank weapons. (Alvis PLC)



A Warrior Reconnaissance Vehicle participates in company live-firing trials using the stabilized 25mm M242 cannon. The two TOW launchers, which are protected by a dust cover, are visible in the moving position on the sides of the Delco LAV-25 turret. (Alvis PLC)

Kuwaiti Desert Warriors

So far Kuwait is the only other user of the Warrior besides the British Army. After intensive desert trials in which the Desert Warrior competed against the M2 Bradley, Kuwait ordered 254 vehicles from the Warrior vehicle range in August 1993. The first of these were delivered by November 1994. While the bulk of the order was for Desert Warrior infantry section vehicles, there were also MCRVs, MRV(R)s and infantry command vehicles delivered. After instructors were trained in the UK, the Desert Warrior officially entered service with the Kuwaiti Army in mid-1995.

Designed by GKN Defence for export, the Desert Warrior was aimed for the armored personnel vehicle market in the Middle East, competing mainly with the US-made M2 Bradley and the Russian-built BMP series of vehicles. The first variant of the Desert Warrior was fitted with a Delco two-man power-operated turret armed with a stabilized 25mm M242 Bushmaster cannon, a M240 7.62mm coaxial machine gun and two banks of four smoke grenade dischargers, one on each side of the turret. The vehicle was first shown at the British Army Equipment Exhibition (BAEE) in 1986. Earlier that same year, the series production of Warrior for the British Army began in Telford. From 1994 onward, the Desert Warrior was shown with single-tube TOW ATGW launchers mounted on each side of the turret and fitted with a thermal-imaging sight, both being manufactured by Raytheon Systems Company.

The sighting equipment of the Desert Warrior consists of the M36E1 sight unit with a x7 magnification day sight and a passive night vision

intensifier. The M36E1 can be interchanged with other sights such as the Delco Improved M36 sight with laser range finder. The two banks of four smoke grenade dischargers were moved to the sides of the 25mm gun on the front of the turret. Desert Warrior demonstrators were fitted with five firing ports on the sides and at the rear of the vehicle, and to each of these belonged a roof-mounted periscope. Together they allow the seven infantrymen in the vehicle's troop compartment to use their assault rifles without leaving the vehicle. Other modifications on the Desert Warrior are an improved Perkins Power Pack for operating in high temperature areas, an engine-driven air-conditioning system, an overpressure NBC protection system, GPS, and a roof-mounted laser detector.

Kuwaiti Desert Warrior infantry section vehicles are all fitted with the second version of the TOW-fitted Delco turret. With the stabilized gun mounted in the turret, the crew of the vehicle is able to engage and destroy standing and moving targets while the Desert Warrior is moving. For greater protection against enemy small arms fire, the turret of the vehicle is fitted with passive add-on armor that provides protection against 14.5mm AP rounds and fragments from 155mm artillery rounds. The front and sides of the modified chassis of the Kuwaiti Desert Warrior are also fitted with passive armor that is bolted onto the Warrior's welded Alcan Plate armor hull. Like the Desert Warrior demonstrators, all Kuwaiti Warriors, including the MRV(R) and MCRV, have an improved Perkins Power Pack for operating in the desert, as well as the GPS, an engine-driven air-conditioning system, and an overpressure NBC protection system.



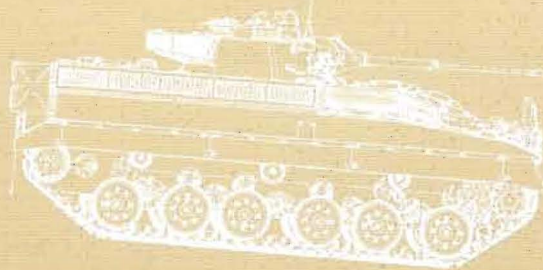
Desert Warrior of the 35th Mechanized Brigade of the Kuwaiti Army seen on the bi-national French/Kuwaiti Exercise "Pearl of the West" in November 1996. The exercise was conducted in northern Kuwait close to the Iraqi border. In addition to the Desert Warrior, the Kuwaiti Army is also equipped with 46 BMP-2s and 55 BMP-3s. The bolted-on additional passive armor on the vehicle's front and side is clearly visible. Note the wire cutter on the roof of the vehicle and the periscopes on the driver's hatch. (Yves Debay)



Photographed somewhere in the Kuwaiti desert in 1996, this Desert Warrior provides a good view of the three periscopes at the driver's hatch and the passive additional armor on the vehicle's front. Modifications on the Desert Warrior include 27 changes, among which are the visible changes on the engine compartment air intake and exhaust system, which also received a new grating. To minimize the clouds of dust, specially designed flaps were added to the vehicle's front and rear end of the trackway. (Yves Debay)

The driver's hatch of the Desert Warriors sold to Kuwait is fitted with three periscopes. The central one can be replaced by a passive night vision periscope for operating at night. Like the US Marines' LAV-25, the Desert Warrior is fitted with the Delco 25mm turret. The main armament of the vehicle is the 25mm M242 Bushmaster cannon designed by McDonnell Douglas. The two TOW ATGW launchers on either side of the turret are shown here in the retracted position. The GPS receiver is visible on the Delco turret roof next to the wire cutter between the gunner's and the commander's sights. Also visible are the position of the coaxial machine gun and the smoke dischargers. (Yves Debay)





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